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Founded 1896

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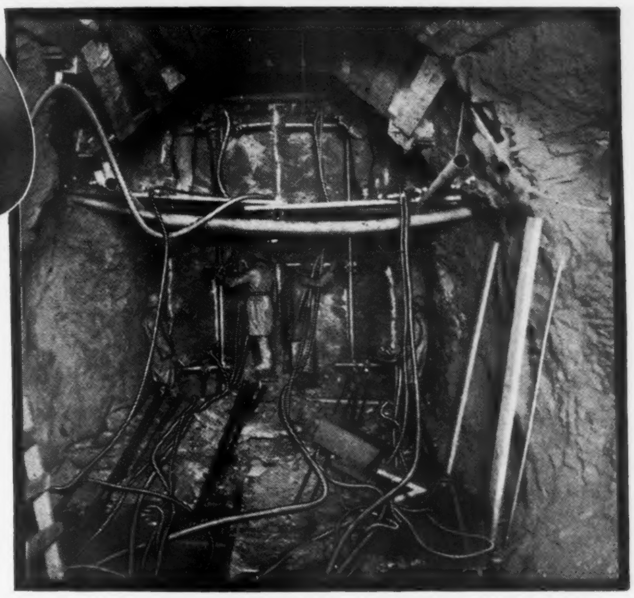

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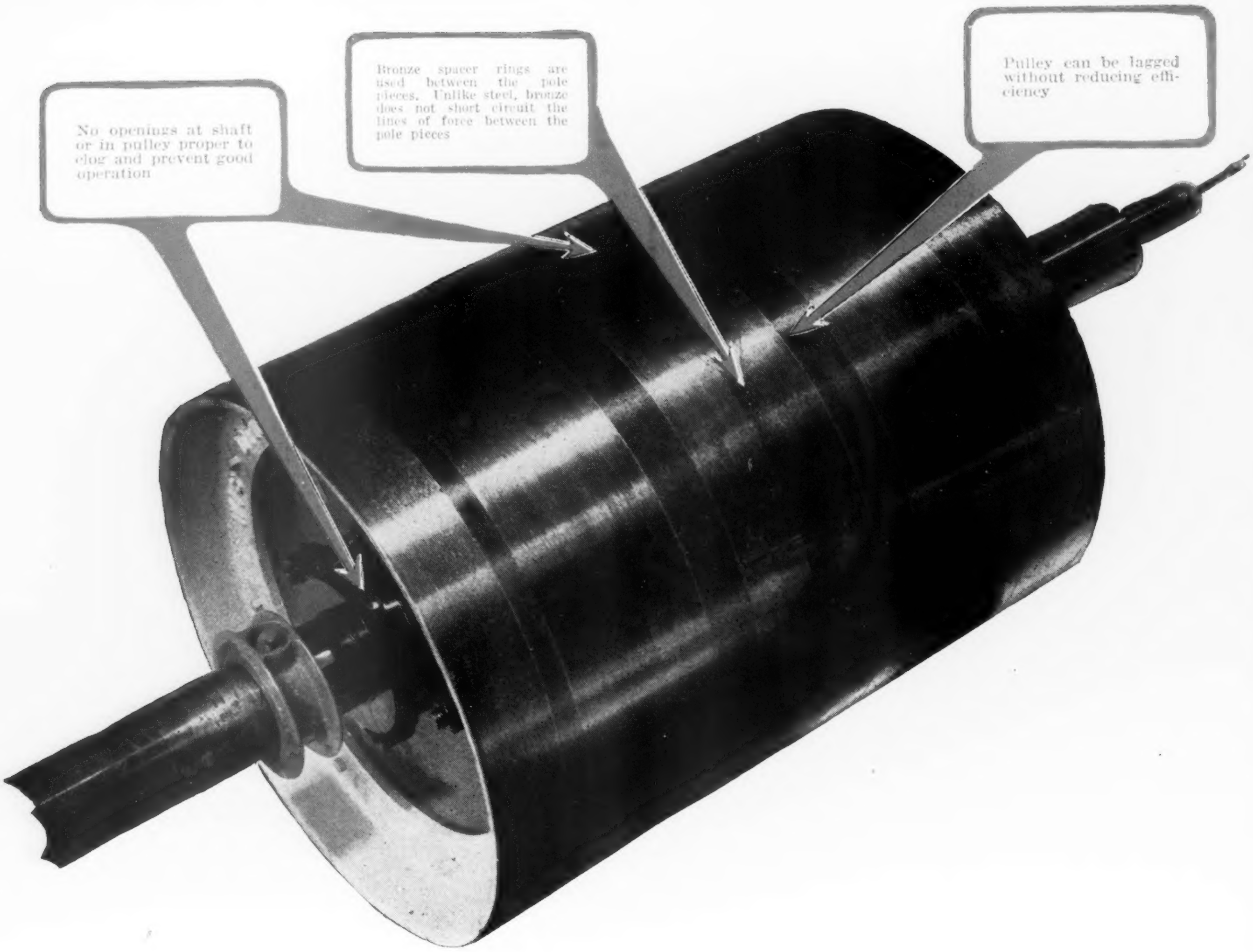

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Rock Products
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Filming the Lime Industry*

By Henry M. Camp
Manager, Eastern Division, National Lime Association

IN TRADE EDUCATIONAL and extensional work, the motion picture is coming to be a very forceful medium. The public, with its various tastes for movie entertainment and instruction fills the theaters daily for the thrill and charm that only can be brought forth by the impressive visualization of the activities of life or nature in all its details.

So we have thought it appropriate and advisable in our own promotional work to adopt the motion picture to tell the story of the hazards the exercise of care and the precision involved in the modern manufacture of lime, and the story of its major uses as an essential in agriculture and construction.

The picture entitled "The Age of Lime," was produced under the auspices of the commercial development department of the Baltimore and Ohio Railroad Co. by Dr. George B. Shattuck, scientist for the railroad, with the co-operation of the National Lime Association.

Starting with the blast in the quarry, wresting the raw material from mother earth, through the various stages of production until we reach the loading of the freight car with the finished product comprise the manufacturing scenes of the picture. From then on the picture is devoted to the principal uses of lime in agriculture and construction. In agriculture, beginning with the quantitative lime requirement test of the soil in the field to determine its lime hunger and ending with the crop protection of the growing plant by the use of the dust and liquid sprays of lime in combination with various poisonous elements, the essential place of lime, as a farming necessity of indispensable importance to the public interest and welfare, is readily observed. For, without lime in the soil, the nutrient value of many of the human and animal foods would be somewhat reduced and the production of the general food supply of the country and of world would be seriously curtailed.

Now, that we have given proper consideration to the relation of human existence and rainiment to lime, we turn to shelter and show the general usefulness in modern construction practice, for "there is no place like home."

The pictures demonstrate the beneficial effect of lime as an admixture to concrete to improve its workability and density, which is conducive to increased strength and the economy accruing in the placement of the mass. The predomination of lime in the composition of brick mortars insures the natural white joint so desirable with the several shades of brick and gives a contrast that is most pleasing and artistic. The beautiful stucco textures made possible through the plastic nature of lime and the hardness of surface of good lime stucco; the modern machine method of mixing mortar for plaster on a large scale; the correct method of slaking lime; all stages of the plastering job on concrete, hollow-tile, wood and metal lath backings and the details of fine workmanship in the accomplishment of a first-class coat of plastering—all are shown by actual example. A striking example of perfect "keys" on wood and metal lath backings for full security of the base coats, the completed stucco house and the brick house are some of the "shots" that have been carefully planned and photographed so as to bring out the characteristic good qualities of lime as a structural material.

The picture was begun in 1923; it is not yet finished and may not be for some time, as new scenes are constantly being added. The first "shots" embrace scenes of the work of the soil improvement train conducted by the Baltimore and Ohio Railroad Co. in the summer of 1923, with which the

Filming the lime industry from the quarry to the side of a house

*Address to the Annual Convention of National Lime Association, Briarcliff Lodge, Briarcliff Manor, N. Y., Wednesday, May 27, 1925.

National Lime Association co-operated. With the inspiration to go further into the subject of the industry of lime, it was decided to make a true-to-life depiction of the production and use of the product and to gradually build the picture as time and opportunity would permit on the part of the railroad company and the association. The "shots" were made in New York City, Brooklyn, Chicago, District of Columbia, West Virginia, Ohio and Maryland. Approximately 150 different scenes were recorded, in which a number were excluded from the final make-up of the picture, as impractical, or by reason of defective lighting facilities, etc.

Pictures of Industrial Uses of Lime to Come

We have been unable, as yet, to reach the taking of pictures on the major uses of lime in chemical and industrial plants due largely to lack of time, and, further, the desire to keep the general picture within the capacity of 4000 ft., or that amount of footage which can be shown in continuous operation not to exceed 40 minutes.

In the make-up of the picture, it is so laid out that for strictly an agricultural audience the four reels of approximately 1000 ft. each, constituting the entire picture, may be divided into two reels of about 2300 ft., comprising the production and farming scenes; or, in the case of a construction gathering, the picture may be limited to two reels of about 2700 ft. to include production and structural scenes. If organizations, such as the Rotary or Kiwanis clubs, may desire only the production feature, one reel of about 1000 ft. can be provided, requiring about 12 minutes to show.

So, as now constituted, the finished picture of four reels and approximately a total of 4000 ft. of film may be considered primarily, as a popular instructional feature in trade extensional work for lime, of interest to both farming and construction gatherings, the commercial audience and, as well, the lay public.

We hope to go on with the work and make such revisions and additions, consistent with the limitation of footage allowable in a general subject, not to exceed 4000 ft., or 40 minutes on the screen, with the ultimate ambition to have the picture a brief, but complete, visualization of the lime industry—what the product, lime, is, how it is made, how and why it should be used to economic advantage and its eternal essentiality to the public interest as one of the foremost mineral resources and basic materials of the country.

For General Distribution

Several prints of the negative of the reel will be made and distributed for educational purposes by the commercial development department of the Baltimore and Ohio Railroad Co. It will, I hope, be the purpose of this association to keep the picture in constant circulation in proper application to the need for more visual education of both a specific and general nature, in behalf of the better understanding of the fundamental properties of lime and for greater efficiency in the use of the product.

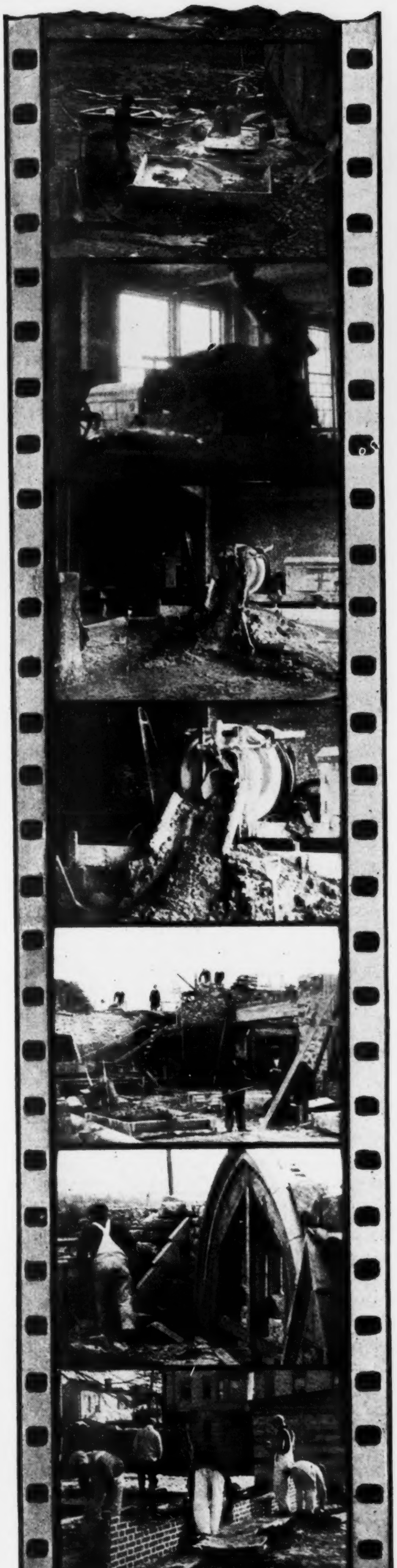
Henry M. Camp

MR. CAMP, in point of years of service to the lime industry, is a real veteran in promotional activities. He has tried all methods, and he is enthusiastic about the possibilities of educational and promotional "lime movies."

The description of the film herewith has several shortcomings. It does not say anything about one of its most interesting features—the use of animated cartoons to simplify the explanation of the part of agricultural lime in neutralizing soil acidity.

The little soil demons, which get into the soil and prevent the industrious good little fellows from helping the plant grow, are chased away by lime soldiers. The whole "action" is very cleverly thought out and executed; and it would seem that it must leave a lasting impression on the dullest intellect. At the same time the lesson is so amusingly illustrated and well done that it is not offensive to the most scientifically educated intellect.

No pictures from the agricultural section of the film are shown herewith, but the typical ones from the construction industry give a good idea of the general character of the film.—The Editors.



Dr. Shattuck

THIS is the gentleman who actually made the picture, gave it its name, "The Age of Lime," did all the photographic work and the editing of the titles. A scientist, university professor of geology, at Vassar and Johns Hopkins, an explorer, writer and lecturer, comprise a few of his many interesting occupations for the past thirty years.

After thirteen years at Vassar College, as professor of geology and natural history and the head of its department of geology, he resigned to go to Africa for the Famous Players-Lasky Corporation and secure motion pictures of savages in the native jungle villages, wild animal life, and other nature of more or less an undomesticated and untamed character; and, after about a year of this thrill and excitement, he brought back to America five miles of film.

Thereafter, he became connected with Famous-Players Lasky in charge of research work at their great studios at Long Island City, N. Y., from which he decided to get the picturized movement of rail transportation, and that is where we met in the mutuality of our trade promotional relations for lime with the Baltimore and Ohio Railroad Co.—Henry M. Camp.

Mr. Camp writes the editors, in transmitting his manuscript: "I humbly regard the production of this moving picture an exceptional accomplishment in our trade promotional relations with the railroads; particularly the Baltimore and Ohio, which is very active in its efforts to build tonnage for industries located on its lines."

"Fireless Cooker" for Increasing Efficiency of Rotary Lime Kilns

Irving Warner, Vice-President of the Charles Warner and the American Lime and Stone Companies, Granted Patent for Interesting Invention

Irving Warner

A PATENT was issued to Irving Warner, vice-president of the Charles Warner and the American Lime and Stone companies, on June 16, for a process of lime manufacture designed to increase the efficiency of rotary kilns. The invention of the process is the outgrowth of experiments at the American company's plant at Bellefonte, Penn., during the period it was under Mr. Warner's management. In the language of the patent specification the process is described as follows:

"As is well known in the art, the use of a rotary kiln in the burning of lime is open to the objection that it is difficult, if not impossible, to secure a complete burning of the lime. Due to the inherent tendency of the smaller stone in the rolling mass to gather at the center, the larger stones prevent the heat from contacting with the small stones. By grading the limestone so that the largest stone shall not be more than 2 or 2½ times the size of the smallest stone improved results are obtained, but this method of operation results in a loss of valuable raw material. By limiting the thickness of the layer of stone in the kiln, more complete calcination is obtained, but this method results in a loss in capacity and efficiency of the kiln. While these methods or a combination of the methods may partially overcome the difficulty of imperfect calcination they are open to the serious objection that they add materially to the cost of production.

"An object of the invention is to provide an economic process for obtaining completely calcined lime, and more specifically to provide a process in which a rotary kiln may be employed in the normal manner for performing one step of the process. The invention also contemplates the provision of appropriate apparatus in which the process may be performed.

"According to current practice, the incompletely burned lime is cooled as rapidly as possible after its discharge from the rotary kiln, but in carrying out my process the hot mixture of burned and unburned lime is stored for an appreciable time in a heat-insulated receptacle. In the storage or seasoning receptacle the unburned lime is raised to or above the decomposition temperature as the entire mass assumes a uniform temperature. The transfer of heat readily takes place since the pieces containing unburned lime or "core," i. e. showing the presence of CO_2, are quite small and are evenly distributed throughout the mass.

"The average temperature of the lime discharged from a rotary kiln is usually about 500° to 800° F. above the temperature of dissociation and it is evident from a mathematical standpoint that this excess heat, when properly conserved, is sufficient to complete the calcination of such quantities of unburned lime as may be produced in a heavily loaded kiln. The latent heat of dissociation of $CaCO_3$, per pound of CO_2 evolved, is 1754 B.t.u. and the specific heat of lime is 0.217, hence the excess temperature over the temperature of dissociation necessary to drive off one per cent of CO_2 is

$$\frac{\text{Latent heat of decomposition of } CO_2}{\text{Specific heat of lime} \times 100} = \frac{1754}{0.217 \times 100} = 81° \text{ F.}$$

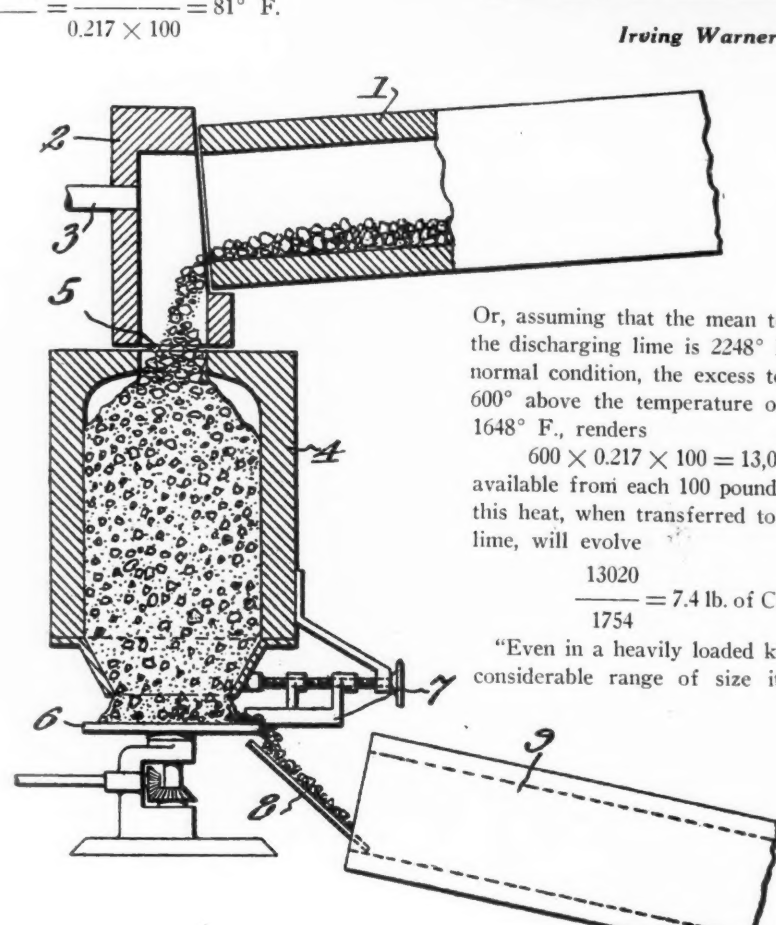
Or, assuming that the mean temperature of the discharging lime is 2248° F., which is a normal condition, the excess temperature of 600° above the temperature of dissociation, 1648° F., renders

$$600 \times 0.217 \times 100 = 13{,}020 \text{ B.t.u.}$$

available from each 100 pounds of lime, and this heat, when transferred to the unburned lime, will evolve

$$\frac{13020}{1754} = 7.4 \text{ lb. of } CO_2$$

"Even in a heavily loaded kiln and with a considerable range of size it is compara-



A device for increasing the efficiency of rotary lime kilns

tively easy to burn down to a CO_2 content of 4 to 8% but it is very difficult to make a more completely calcined product. From the figures given above it will be seen that the sensible heat of the lime will be sufficient to complete the calcination when the mean temperature of the lime, as discharged from the kiln, is from 325° to 650° F. above the dissociation temperature.

"In the accompanying drawing, the figure is a vertical section illustrating one form of apparatus which may be used in carrying out my novel process.

"In the figure, the numeral 1 identifies the discharge end of a rotary kiln which is provided with a kiln hood 2 in which the fuel nozzle 3 is located. These parts of the apparatus may be of any standard design and any of the usual fuels may be employed. The heat insulated receptacle 4 is arranged below the kiln hood and the inlet 5 of the receptacle is made as small as practical to prevent loss of heat by radiation from the lime within the receptacle. The top and walls of the receptacle 4 are jacketed with or formed of any suitable material of low thermal conductivity to provide for the thorough insulation against heat losses. A suitable feeding out device, such as rotating table 6 and an adjustable knife scraper 7 may be employed for discharging the completely calcined lime from the seasoning receptacle. The hot lime removed by the scraper 7 falls upon a chute 8 which conveys it to a cooler, such as a revolving cooler 9. Although the inlet opening of the receptacle is designed to prevent loss of heat by radiation and convection it is not essential that the outlet opening be air tight, in fact the ingress of a small quantity of air such as would normally takes place with any feeding device of common use will be helpful in removing the CO_2 evolved during the seasoning process.

"The capacity of the receptacle is preferably such that it will hold about 4 hours' output of the kiln but seasoning for much shorter periods may be sufficient to complete the calcination and a seasoning of even one hour or a half-hour will greatly improve the product. The discharge mechanism is so regulated that the receptacle may be kept as full as possible at all times.

"It is to be noted that the process does not contemplate a cooling of the mass within the receptacle but is based upon a transfer of heat between unequally heated particles in a highly heated mass. So far as is possible, the heat of the lime as it leaves the kiln is conserved and the seasoned lime is fed from the receptacle at substantially the same rate as the kiln-burned lime enters the top, with the object of maintaining the greatest mass possible within the seasoning receptacle and keeping the material contained therein at substantially the same level. This will permit a seasoning receptacle of any given size to operate at its maximum efficiency and when the lime is removed from the bottom it may be cooled by any of the processes now employed for cooling the burnt lime as discharged directly from the kiln.

"It will be understood that the invention is not limited to the specific apparatus which is shown in the drawings, since various forms of heat insulated receptacles and associated chutes or conveyors may be employed in carrying out the process.

"While I have in the claims referred to a rotary kiln, my invention includes other like calcining means in which the limestone is subjected to calcining conditions like those in a rotary kiln.

"I claim:

"The process of making lime from limestone which consists in heating the same in passage through a rotary kiln to a temperature above that of dissociation and then transferring the heated mass, while still above the dissociation temperature to a heat insulated receptacle and permitting the mass to remain in this receptacle for a sufficient time to complete the calcination."

Mr. Warner writes that he has carried out experiments at Bellefonte and Cedar Hollow and has noted a distinct improvement in the analysis of the lime due to the treatment described. Changes are being made at the Bellefonte plant to give the process a thorough trial.

Building 2000-Ton Storage Tank at American Lime and Stone Plant

A LARGE concrete tank in which to store hydrated lime is under process of construction at the Bellefonte, Penn., plant of the American Lime and Stone Co.

The tank is to be located at a point midway between the hydrating plant and the quarry. The new storage bin will be circular, 40 ft. in diameter and 50 ft. high, and will have a storage capacity of 2000 tons of hydrated lime.

The company already has three tanks of 250 tons capacity each, inside the hydrating plant.—*Williamsport (Penn) Sun.*

Standard Specifications for Lime Plaster

THE first section of the National Lime Association's bulletin No. 305A contains complete specifications for the preparation and use of lime plaster on all types of backings. These specifications are in such a form that they may be copied directly or used as a basis for any architect's complete plaster work specifications.

The second section is a short form specification which may also be copied directly if condensed specifications are desired.

The third section contains definitions and notes with reference to several sections of the standard specifications, amplifying certain portions of the brief wording necessarily used in writing a set of standard specifications.

Prospective Railroad Construction

ALL indications point to a continued pick-up in railroad construction activities as may be seen from the following reports, which are well authenticated. These are but a few of the projects now contemplated.

The Louisville and Nashville are at work on plans to connect up the Clinchfield Railroad. About 140 miles of new line, it is stated, will be built in the mountains of Kentucky and Virginia in a very rough country. When this work is completed the Louisville and Nashville, the Clinchfield and the Atlantic Coast Lines will be connected into a continuous through route. Engineering investigations have shown that the work will be exceedingly expensive. One section covered by a preliminary survey would cost $362,000 a mile. The Louisville and Nashville has applied for extension in time until December 31st to present its plans and make further surveys for the purpose of discovering a route which will not be so excessively expensive.

The Denver and Rio Grande Western Railroad has applied for a commission from the Interstate Commerce Commission to build a 130-mile branch northeast from Soldier Summit to Vernal, Utah, in order to develop rich mineral resources and agricultural possibilities. The cost is estimated at about seven million dollars.

The Salt Lake and Denver Railroad has also applied to build a line from Provo, Utah, eastward about 250 miles to the present terminal of the Denver and Salt Lake Railroad at Craig, Colorado.

The Great Northern Railway is planning a 50-mile extension of its present branch, running from Bainville to Scobey, Montana. This branch will be extended from Scobey to Ophiem and Glentana. The cost will be about $1,500,000.

The Santa Fe has engineers in the field making survey for a proposed extension from Seagraves to Carlsbad, New Mexico, about 115 miles, with the ultimate purpose of extending southwest to El Paso about 125 miles.

It is reported that as soon as the merger of the San Antonio, Uvalde and Gulf Railroad with the Missouri Pacific is accomplished, a 45-mile line will be built between Fowlerton and Three Rivers, Texas, and another 50 miles from Crystal City to Eagle Pass. This will give the Missouri Pacific a new through route to the Rio Grande gateway, where connection will be made into Mexico.

The Quebec Extension Railway has obtained authority to construct a new line from Washburn on the Canadian border, 112 miles into the state of Maine. It is provided that construction be commenced by September 1st of this year and be completed by December 31, 1927.—*The Excavating Engineer.*

Theory and Practice of Lime Manufacture*

Part II—The Effect of Excess Air on Lime Kiln Efficiency

By Victor J. Azbe
Consulting Combustion Engineer, St. Louis, Mo.

THE treatment herewith is a little more technical than the article in ROCK PRODUCTS, May 2, 1925, "Volatile Matter—Its Effect on Lime Kiln Efficiency." The reader is referred to this article for a more complete discussion of the ills arising from irregularity in lime-kiln operation.

Effect of Excess Air on Lime Kiln Efficiency

Excess air used in combustion of fuel is far more serious in lime kilns than boiler practice. The reason for this is the difference in temperatures of evaporation of water and temperature of decomposition of limestone. At 135 lb. gauge pressure, steam is generated at 360 deg. F. while the decomposition temperature of limestone is generally accepted to be 1650 deg. F. If in boiler passes the temperature drops to below 360 deg., no steam will be made and in the lime kiln no lime will be made if temperature drops below 1650 deg. F.

The above and also the following contentions are somewhat modified by the fact that the outer layers of limestone decompose at lower temperatures than 1650 deg. but most of it evidently must be decomposed at 1650 deg. F. so this figure will be taken as correct in this case.

It is possible to operate a lime kiln so that the stone charge throughout the kiln will be red hot without a particle of lime being made. This occurs when more than 120% of excess air is used for burning the fuel. The excess air dilutes the gases to such an extent that temperature is lower than that necessary for decomposition of limestone; as a consequence the stone will take on only the sensible heat, no heat of decomposition, consequently the amount of heat abstracted from the hot gas being much less, the temperature at the outlet of the kiln will rise.

For every pound of limestone burned, a definite amount of heat is necessary to preheat the stone. The heat of decomposition is 1378 B.t.u. per pound of lime and the heat necessary for preheating is about 619 B.t.u. The heat below 1650 deg. F. can, in the main, only be used for preheating of stone and the amount that is not used in this way is mostly wasted.

As the excess air used for burning of the fuel increases, waste gas temperature also increases, until finally a point is reached where the kiln charge takes on no heat, the only heat disposed being by radiation.

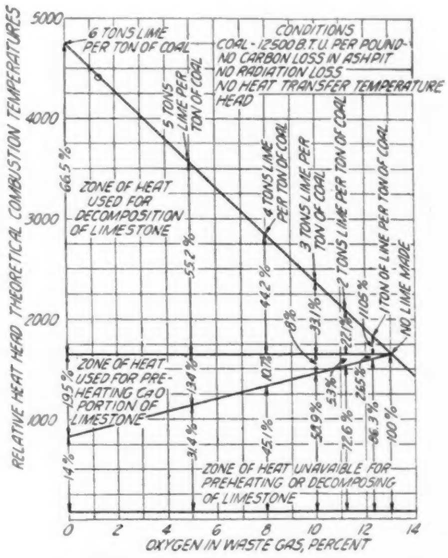


Fig. 1. Illustrating graphically the effect of too much air (oxygen)

Fig. 1 is a theoretical exposition of the principle discussed. It will be noted that provided there is no loss due to incomplete combustion, carbon in ash, or radiation and if the gas flows properly through the kiln, that at zero oxygen, that is, no excess air point, six tons of lime will be made per ton of 12,500 B.t.u. coal. Under these conditions 66.5% of the heat will be used to decompose limestone, 19.5% to preheat limestone and only 14% will be waste.

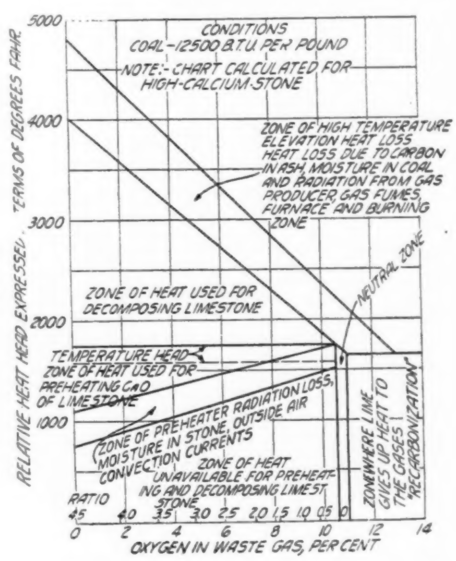


Fig. 2. Illustrating graphically the effect of too much air (oxygen)

If, on the other hand, the kiln is operated with an amount of excess air represented by 8% oxygen, the ratio of lime to coal will be as four to one, 44.2% of the heat will be used for decomposition purposes, 19.8% for preheating and 36% will be wasted.

It appears as if the amount of heat necessary for preheating of stone is very little. This is so because the heat used to preheat the CO_2 portion of the $CaCO_3$ becomes again available for preheating stone so only that portion used for preheating CaO of $CaCO_3$ can be considered in this case.

While the theoretical waste gas temperature at six to one will be about 850 deg. F., at four to one will be 1350 deg. F. and it will continue to climb until 1650 deg. F. is reached when the loss will be 100%.

In practice results will be worse and excess air will have even a greater effect upon efficiency, this for the reason that while limestone is a fairly good conductor of heat, lime being porous, is a bad conductor and will transfer heat only about one-sixth as well. While limestone is burned, it will become coated on the outside with lime and as this coating increases in thickness, it becomes increasingly difficult for the heat to penetrate. If the temperature externally of the lime coating would be only the 1650 deg. F. there would be no temperature head and it would take a very long time for the heat to penetrate. To increase this transfer, a temperature head is maintained which may be as high as 850 deg. F., that is, the temperature of the flame would be 2500 deg. F. If the temperature head would drop off to below 100 deg. F. very little lime would be made; and as a practical proposition, none, because too long a time would be required to calcine the core and kiln capacity would not be high enough to be considered practical.

Fig. 2 takes radiation, carbon in ash loss, and temperature head into consideration. As a temperature head of 150 deg. F. was accepted, radiation and carbon in ash loss was assumed at 25%, 17% of this was from the burning zone and 8% from the preheating zone. It will be noted that under these more practical conditions, the amount of lime made per ton of coal, is much less; being only 4.4 tons per ton of 12,500 B.t.u. coal as compared in the previous theoretical

*From a paper read before the National Lime Association Convention, May 28, 1925.

case of 6 tons of lime per ton of coal.

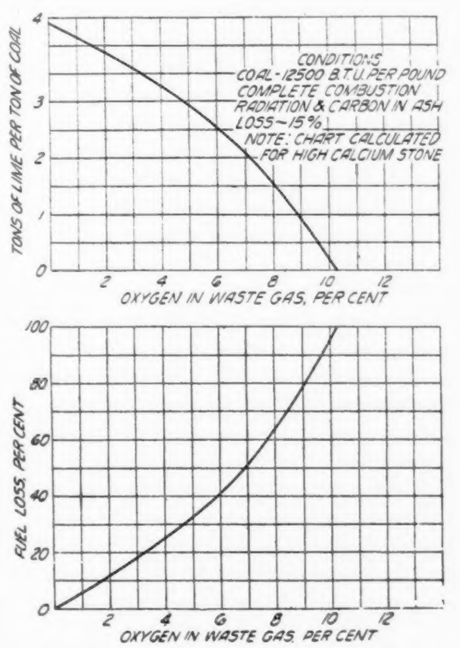
It will also be noted that at slightly over 10% oxygen, no lime is made, or better expressed, it is made at such a slow rate that from a practical angle, kiln capacity is zero.

In case of a boiler when the fire is poor, fuel is wasted; but the fire never gets so bad that the furnace temperature is so low that heat would be taken from the steam in the boiler. In lime kilns this occurs frequently. When the kiln is drawn and the fire cleaned, the oxygen usually runs to beyond the 11.5% point. Whenever this occurs, heat is given up by the hot limestone to the gas instead of receiving it. The loss of heat in this may be quite serious and some of the lime already made may be even recarbonated. Fig. 2 shows the location of this zone of reversed heat flow. It thus becomes apparent that the fuel loss in lime kilns cannot only be 100% of the coal fired in a given period but it actually can be more than this and it quite frequently is.

Fig. 3 gives the ratio of lime to coal obtained under conditions outlined and illustrated in Fig. 2. The chart is based on 12,500 B.t.u. fuel; if the heat value is greater or less, the ratio will vary proportionally. If there is incomplete combustion, the results will be poorer than shown.

Fig. 4 shows the same only expressed in terms of fuel loss percentage.

Even when the kiln is operated with 2% oxygen, fuel loss is 12%. If oxygen is



Figs. 3 and 4. Decrease in lime production and loss of fuel due to too much air (oxygen)

6%, fuel loss becomes, 40% and thereafter it mounts very rapidly.

Low oxygen means high temperature when mixing is good so there is a possibility that under the most economical fuel burning conditions, the temperature developed will be so great that lime may be overburned. To prevent this without sacrificing fuel economy, kiln furnaces and kiln firing should be such that most of combustion will take place in the kiln in contact with the rock and lime, extracting the heat. Fortunately, low oxygen means retarded combustion so heat will be extracted almost as fast as formed and temperatures will not get too high.

Infrequent firing is the greatest factor conducive to fuel loss. There is incomplete combustion at first, then the fire burns down and there is an excess of air which rapidly increases. During drawing of kilns especially, the excess air often goes so high that oxygen percentage often ranges around 15%, and while usually there is very little fuel burned at such a time, heat is wasted anyhow, caused by reverse flow, that is flow of heat from lime to gas.

The contentions made here may be not fully correct under all conditions. The point of zero production may be at a higher or lower oxygen content, the actual point will be determined by possible lower or higher temperature head, or different decomposition temperature or different radiation loss, but in spite of this, there is no doubt that:

"TOO LARGE AMOUNTS OF EXCESS AIR USED FOR BURNING OF FUEL IS RESPONSIBLE TO A GREAT EXTENT FOR INEFFICIENCY OF LIME KILNS."

Keep oxygen percentage down as low as possible without causing too great loss due to incomplete combustion. Keep it as constant as possible and keep it also down when drawing kiln or cleaning fires.

EDITORS' NOTE

WE wish to emphasize again the desirability of a thorough study of Mr. Azbe's paper by practical lime-plant operators. Neither Mr. Azbe nor the editors, who are technical men, are in a position to know just how much of this is intelligible to the average lime-plant superintendent. He is the man to be most benefited by these articles, and if there are any points he does not get and if he will write in and frankly ask questions about those points that are not clear to him, we will endeavor to clear them up.

Also, let it be remembered that Mr. Azbe does not present much of this material as gospel truth but as a theory for lime men to shoot at. Therefore, let's have some shooting. Don't hesitate to ask any question. We look for and welcome them.—The Editors.

QUESTIONS AND ANSWERS

Editors, Rock Products: In reading the first installment of Mr. Azbe's article on "Theory and Practice of Lime Manufacture," I found a few points which were not clear to me, so I am accepting your invitation for comments and questions from the industry thinking that perhaps these same questions may be also common to other lime-plant men:

Questions

1. In the fourth paragraph it is stated that the gaseous products of combustion will weigh 10.40 lb.; why?

2. What is meant by specific heat?

3. How is the figure of 350 B.t.u. of sensible heat per pound of lime entering the cooler derived?

4. Why will these gases carry 4250 B.t.u. when leaving the burning zone at 1600 deg. F.?

5. What does the figure 419.34, which he used in calculating the heat content of the CO_2 from the limestone, represent?

6. How would the heat available for lime burning be increased by 2400 B.t.u. if all the heat above 62 deg. F. in the lime leaving the cooler were retrieved?

A Lime Plant Superintendent.

Answers

1. When a coal of a specific composition is completely burned with no excess air the quantity of gaseous products is, of course, definite. In this case the coal, identified by its heat value of 12,780 B.t.u. per lb., was determined to yield 10.4 lb. of gaseous combustion products under these ideal conditions. It is necessary to know the analysis of the coal to calculate this. These products are essentially carbondioxide (CO_2), water (H_2O), nitrogen from the air (N_2), sulphur dioxide (SO_2).

2. The specific heat of a substance is the quantity of heat necessary to raise the temperature of a unit weight of it one degree in temperature; in our system of units it is expressed in B.t.u. per pound per degree Fahrenheit.

3. Since lime has a specific heat of 0.22 then the heat in it above 62 deg. F. when entering the cooler at 1650 deg. will be $(1650\text{-}62) \times 0.22 = 349.36$ or approximately 350 B.t.u. per pound.

4. This calculation is complex but is based on the same principle as that for finding the heat content in the lime. The heat capacities of the different gases, nitrogen, carbon dioxide, steam and sulphur dioxide are computed from their specific heats and quantities; the sum total of these heat capacities in this case is 4250 B.t.u. Analysis of the fuel is necessary in order to know the composition of the gaseous products, knowing these and their specific heats, their heat capacities at this temperature can be determined.

5. The figure 419.34 represents the arithmetical product of 1600 deg. minus 62 deg. times the specific heat of the CO_2, that is it is the heat capacity above 62 deg. per pound of CO_2 at this temperature of 1600 deg.

6. This figure, 2400 B.t.u., is approximate and represents the heat in 6.19 lb. of lime each of which contains about 350 B.t.u.

Typical Limestone Mining Operations

Shrinkage Stoping in Inclined Strata with Adit Entrance

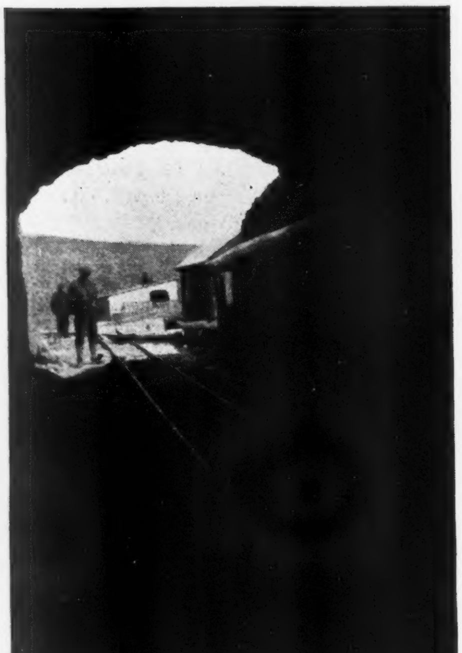
By J. R. Thoenen
Mining Engineer, Greenville, Ohio

THE INGLESIDE LIMESTONE CO. have recently changed their operations at Murke, Wyo. (P. O. Horse Creek, Wyo.) from open pit to underground mining. The mine is located about 25 miles north of Cheyenne, Wyo., on the Colorado and Southern Ry. Limestone is mined for sugar refining, the Ingleside Limetsone Co. being a subsidiary of the Great Western Sugar Co.

Originally the stone was quarried from the outcrop on the top of the mountain and lowered to the screening plant by gravity tram as in Fig. 1. Upon depletion of these upper workings, as far as accessible for open quarry methods, the company decided to tunnel under the mountain and extract the stone by mining. This was started in the summer of 1923 and at the time of the writer's visit (March, 1925) the mine was still in the development stage with no actual stoping having been started. Work was far enough advanced, however, to visualize the ultimate mining method.

The limestone outcrops on the top of the mountain in two veins or ledges, dipping approximately 83 deg. to the east or towards the screen house. At the outcrop both veins contained high calcium limestone with practically no dolomite. No. 1 vein, however, has two narrow seams of sandstone apparently originally interbedded with it. Where this vein was cut by the adit there has apparently been some secondary deposition of magnesia. This is probably due to redeposition from circulating waters as they descended through the limestone.

The adit was started 233 ft. vertically below the floor of the old open pit and driven west 900 ft., where it cut the No. 1 vein. This vein has 35 ft. of limestone on the footwall, which varies in analysis quite markedly over short distances, portions of it running from 80 to 98% $CaCO_3$ with $MgCO_3$ running from nothing to 16%. Above this lies a sandstone stringer from 8 in. to 1 ft. thick with 6 ft. of dolomite above. Overlying this is another thin sandstone stringer and above that 8 ft. of limestone analyzing 98% $CaCO_3$. It is probable that the magnesia in the footwall stone has been dissolved from the overlying dolomite and redeposited in the limestone. About 200 ft. further west lies No. 2 vein containing 24 ft. of high calcium limestone. Both veins show considerable faulting. The limestone is considerably altered, as is customary in nearly all far western deposits, and shows a decidedly crystalline structure.



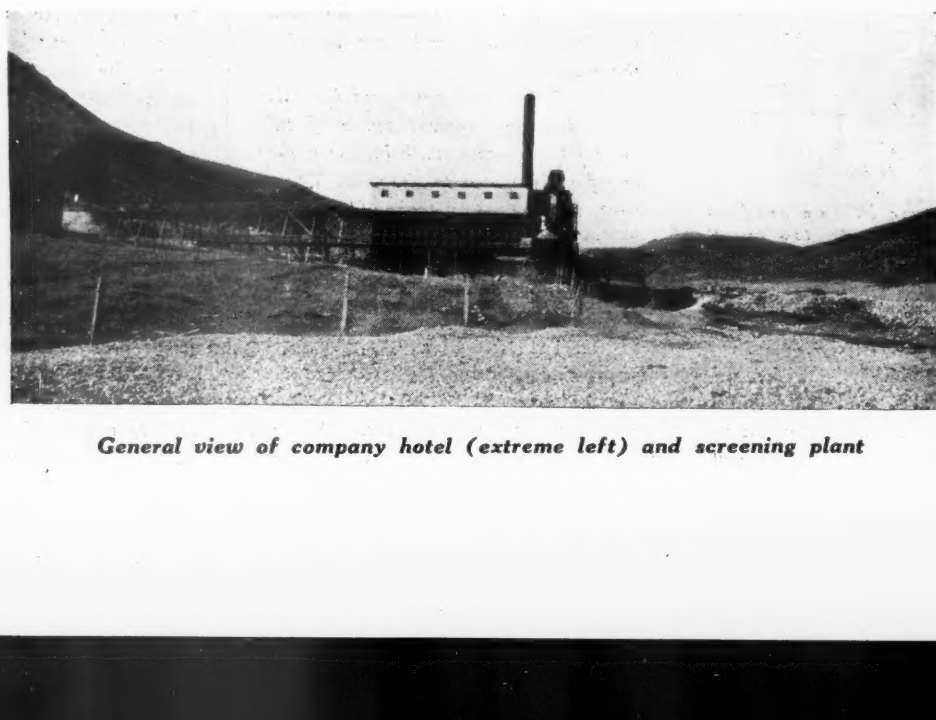
Looking out through the adit portal of the Ingleside Limestone Co. mine

Haulage drifts 9x16 ft. are driven both ways from the adit on the footwall of No. 1 vein and the same will be done on No. 2 vein. Chute openings are cut on the footwall side of the haulage drift at 30-ft. intervals and short raises driven to the stope floor 15 ft. above. These raises are later funneled out at their tops and the intervening stone broken out along the strike in preparation to starting the stopes. It had not been determined at the time of the writer's visit whether to mine the footwall portion of this vein separately and follow later with a smaller stope on the high calcium stone on the hanging wall or to mine the vein as a whole and pick out the low grade stone and sandstone on surface.

Ventilation Through a Drill Hole

A ventilation raise was being driven up the dip on the footwall and had proceeded approximately 136 ft. above the haulage level. This raise will be driven to the surface in the floor of the old quarry. A unique method of temporary ventilation is being used in this development. An 8-in. drill hole was sunk from the surface through the limestone and kept from blocking with loose material. The raise follows this drill hole and when blasts are fired the smoke and gases rise through the drill hole.

Back stoping with flat holes as shown in Fig. 2 (Fig. 8, page 37, ROCK PRODUCTS, June 28, 1924) or rill stoping with inclined holes will proceed both ways from the raise. For the benefit of those who are not familiar with the term "rill" stoping I might say that in this method holes are drilled upward at an angle of approximately 45 deg., similar to upper holes in back stopes, except that instead of working the roof in ascending benches the whole roof over the stope is carried up at the same time in a saw tooth manner. This would be somewhat similar to simple breast stoping in flat seams if they were turned to an inclined position.



General view of company hotel (extreme left) and screening plant

Chutes of timber

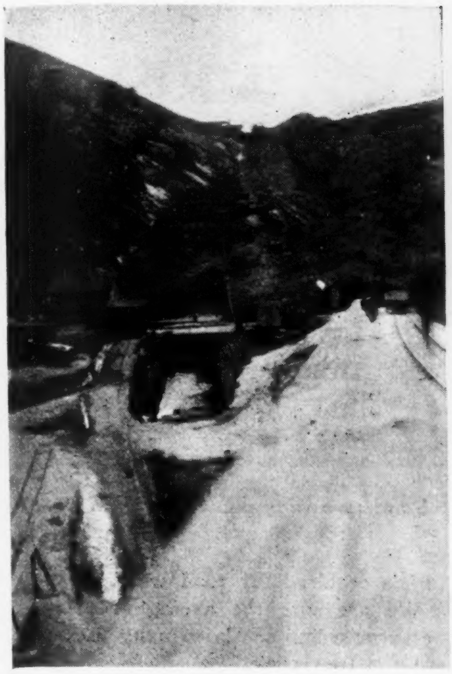


Fig. 1. Gravity tram formerly used to bring stone from top of mountain

and plank construction are built in the haulage drifts. Fig. 3 shows the construction and method of control of the flow of broken stone by planks set crosswise in the chute throat. This picture was taken from an elevation above the car and shows a steel rail grizzly built below the lip of the chute and above the car. Large pieces of stone which have become buried in the broken stone in the stope are caught on this grizzly and block holed prior to loading into the cars. The grizzly also provides a safe platform on which the men operating the chute can stand while drawing the stone. (Author's note—Grizzlies of this nature are usually placed above the throat of the chute in order to prevent large blocks of stone from choking the chute itself. The arrangement here used is unique in limestone mining and not common in metal mining practice.) The grizzly is supported from

Fig. 3. Timber chutes in haulage drifts of mine

timbers standing vertically between the double haulage tracks. Later practice, however, will eliminate these center posts and horizontal timbers from the chute itself will carry the load. The object of this change is to avoid any danger of men being injured between the posts and passing cars.

Present plans do not provide for leaving any pillars in the stopes, which is rather unusual.

Levels are driven by the center V-cut method, using 30 holes with five in each vertical row. Cut holes are drilled 10 ft. deep and others 8 ft. Holes are charged with 40% gelatine in the cuts and 25% in the balance and shot with fuse and electric detonators using No. 8 caps. About 50 lb. of explosive is required to advance the heading 8 ft. All stone broken in drifting is loaded by hand on contract at 50 cents per ton.

Three-ton western side-dump cars of wood construction are used and hauled to surface by a horse.

Denver Rock Drill Co. No. 337 hammer drills are used throughout with ⅞-in. hollow hexagon steel and four point bits. All holes are drilled dry.

Loaded cars from the mine are dumped over an inclined grizzly spaced at 6 in. in the screen house shown in Fig. 4. The rails for this grizzly are bent at an angle of 45 deg. and the cars dump on the inclined portion. Large blocks roll down onto the

Fig. 6. Bar trommels or rotary screens

horizontal grizzly and are sledged by hand. No crusher is used in the plant. Undersize from the grizzlies passes to storage bins below.

Broken stone is drawn from the bins by automatic feeders which deliver to short transverse conveyor belts and they in turn to a 36-in. picking belt running lengthwise of the screen house. Both transverse belts and picking belt are shown in Fig. 5. Dolomite and other impurities are picked off this belt and thrown across the belt to inclined steel chutes which deliver the waste to another conveyor belt which carries it to waste bins or cars.

The high grade stone from the picking belt goes to revolving trommels, which instead of the usual wire screen or punched plate design are constructed with longitudinal bars between which the fine stone passes. At the end of the picking belt

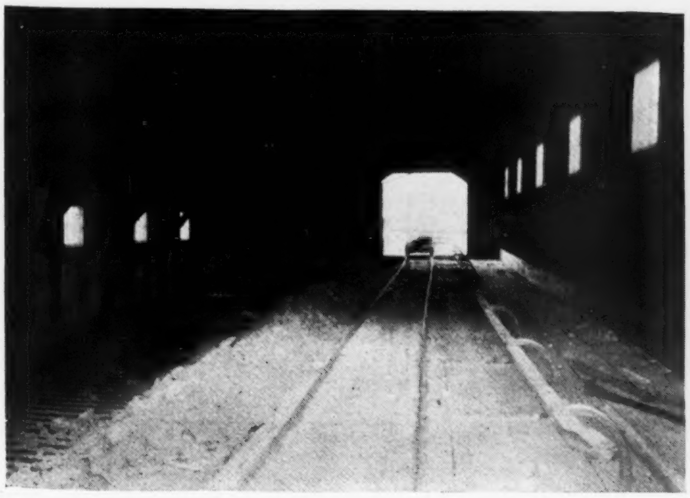


Fig. 4. Inclined grizzly-covered hopper in screen house

Fig. 5. Transverse belts and picking belts

The company hotel, which has all the latest improvements, including radio

General view of hotel and screening plant (extreme right)

there is a 4-ft. section of punched plate screen with 1½-in. holes which takes out the fine material. Oversize from this passes to the bar trommels, where 1½-in. to 3-in., 3-in to 6-in. and over 6-in. material is made and dropped direct to railway cars on parallel sidings. Fig. 6 shows the construction of the bar trommels. The undersize from the 1½-in. screen goes to an elevator which delivers it to a second trommel, where various sizes are made to suit market demands for concrete aggregate or ballast stone. This material can be sent to waste dumps also when there is no market for these sizes. The coarser sizes made over the bar trommels all go to the sugar refineries.

The company has built a modern hotel shown in the illustrations for the use of employes recognizing that in remote localities such as this the comfort of their men is a first requisite to a contented personnel.

G. N. Stadin is superintendent and lives at the plant. It may be amiss to state that while waiting for his train the evening of his visit the writer was invited to the home of Mr. Stadin, where several very enjoyable hours were spent visiting various parts of the country via radio.

Promotional Literature for Trap Rock

PROGRESS is being made daily in the application of modern publicity, advertising and promotional methods to sale of rock products materials. One of the most recent examples to come to our desk is a 52-pp. booklet (5¼x7½ in.) entitled "Trap Rock," for which we believe Albert L. Worthen, vice-president and general manager of the Connecticut Quarries Co., is largely responsible.

The preface says: "The purpose of this booklet is to explain the uses of trap rock and to show its advantages in various kinds of construction. A number of tables are incorporated which should be of value in construction work."

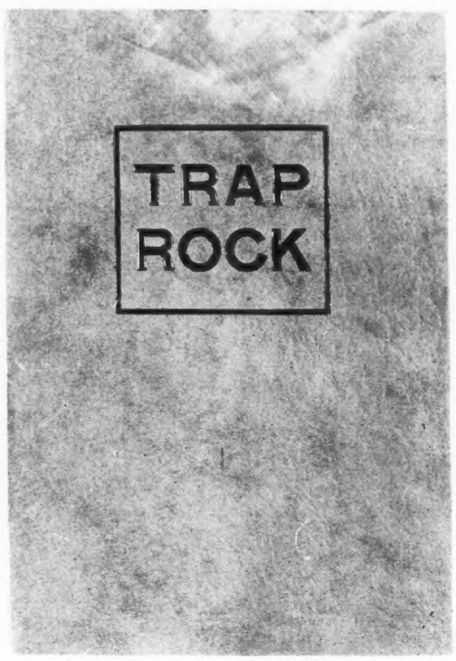
The text is logically arranged and is brevity itself. Trap rock is defined in technical terms, together with its characteristics. Then the advantages of trap rock for concrete-road aggregate, as a substitute for sand, for bituminous macadam, for mixed asphalt pavements, for "screening streets and roads" (that is applying screenings as a dressing), as a dry base for asphalt pavements, for "black base," for sand-asphalt pavements. Then comes a few pages of argument for road improvement in general.

The advantages of trap rock as a concrete aggregate for fireproof buildings, for bridges and bridge foundations, for sewage-treatment filter beds and for railway ballast are set forth.

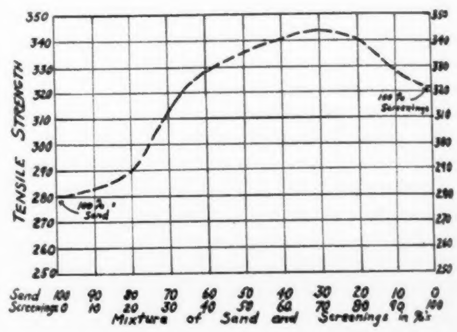
The tables referred to in the first paragraph are tables of the quantity of materials required for road work.

We are sure the average reader will be surprised to see how many uses there are for trap rock.

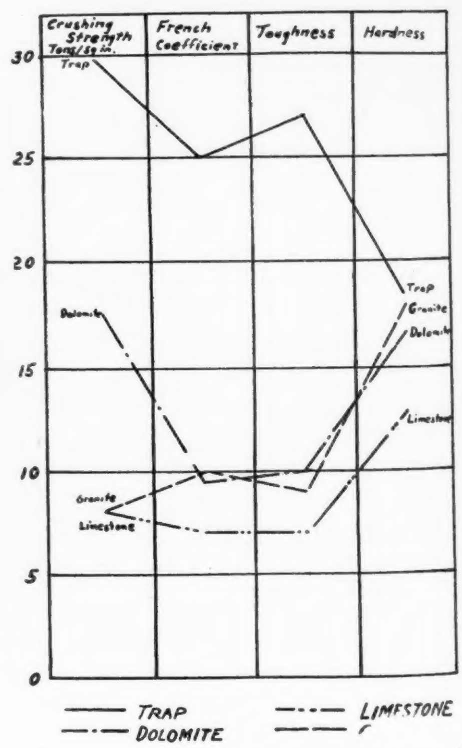
The graphs reproduced herewith are a part of the booklet.



Cover of an attractive booklet issued by the Connecticut trap rock producers



Effect of trap rock screenings added to concrete sand



Trap rock graphically compared with its competitors

Rock Products Activities in the East

Silica Preparation for Ladies' Toilet Powder and a Big Foundry Sand Operation Are Among the New Enterprises Observed

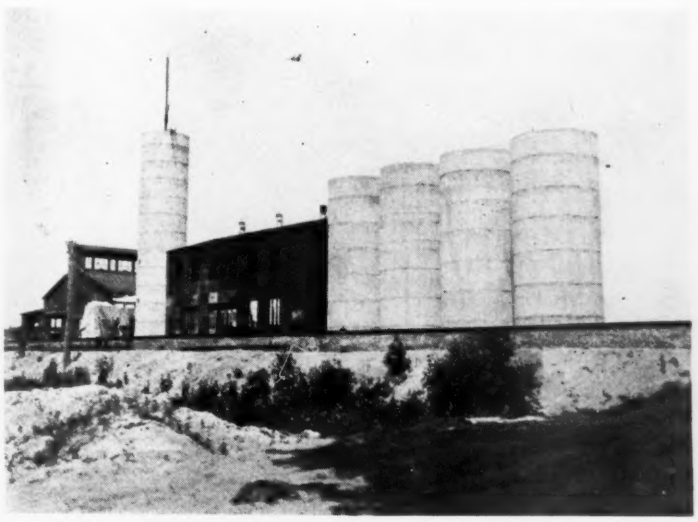
By Edmund Shaw
Editor, Rock Products

RECENTLY I have had an opportunity to make several automobile trips through south Jersey, and on one of these we saw two important rock products plants which may be added to the list of those recently described in these editorial letters.

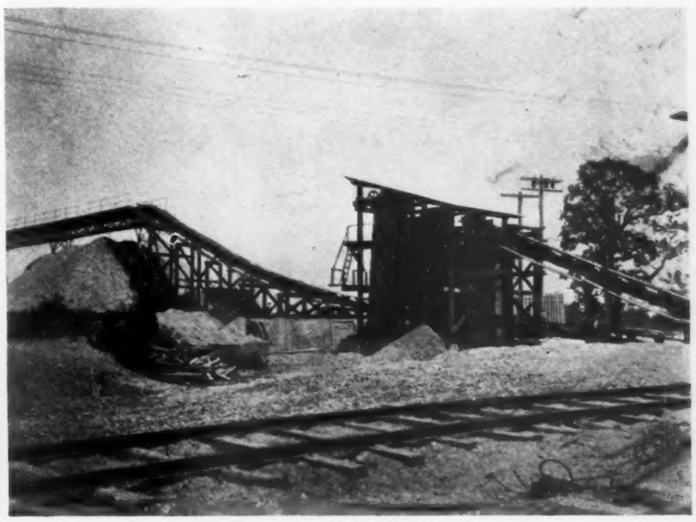
The first of these was the plant of the Pennsylvania Pulverizing Co., near Newport, N. J. The plant, which is not yet completed, is a splendidly built affair with concrete silos and steel frame buildings covered with steel siding. It will work a deposit of beautifully white silica sand which is separated from the buildings by the railroad track shown in the picture. A dredge is being built to excavate the sand.

Speaking of pulverized silica, it is well enough known as a paint filler and an ingredient of the mixture used to make chinaware and for several other industrial purposes; but its use for face powder was a new one, so far as the writer of these lines is concerned, for I had supposed that talc and zinc oxide formed the basis of all such compounds. I am reliably informed, however, that no inconsiderable quantity of silica sand is ground up and perfumed and packed in pretty boxes to be displayed in the drug store windows as "talcum" powder.

The other plant visited in south Jersey was the molding sand plant of Geo. F. Pettinos, near Millville. We think of the molding sand industry as a "shovel and dump cart" business, and Mr. Pettinos started with such equipment. But this spring he installed thoroughly modern excavating and material handling equipment, which brings it in line with the best developed of the rock products industries. The material is dug by steam shovels transported by locomotives to storage pits, drawn out of these by scraper buckets and sent to a screening plant by conveyor belts. From the screens it goes to a storage plant which consists of a long conveyor on a steel trestle. Shipments are made by both rail and barge (the plant is on the Maurice river), and a well constructed dock and tram line serves to load the barges. Under the trees near the plant is a collection of old dump carts which serves as an object lesson of the way the rock products industries grow.



Plant of the Pennsylvania Pulverizing Co., Newport, N. J., where sand is made into "talcum powder"



George F. Pettinos screening and storage system for molding sand

Glimpses of Some New York State Plants

From Atlantic City a night's run on the Lehigh brought me to Rochester, N. Y., in time to attend the meeting of the New York crushed stone producers, an account of which will be found elsewhere in this issue. The meeting was held at the Le Roy plant of the General Crushed Stone Co., which is about 26 miles from Rochester, and we drove out through a section that contains many interesting rock products operations. This section is rather famed for its mineral production. The geology book which I carry as first aid to the ignorant says that the upper 2000 ft. of Silurian shales in this part become more and more calcareous at the top and contain valuable deposits of salt and gypsum as well as limestone, and that in the middle Silurian Clinton formation, which runs from New York to Alabama, are valuable beds of red iron ore.

The first plant we passed after leaving Rochester was that of the Dolomite Products Co., which was described in Rock Products for April 18, 1925. John Odenbach and Frank Waddell, the owners of the plant, were with us, and we made a short stop to see the new electric shovel load motor trucks, by which the stone is brought from the quarry to the plant. This unique system of transportation, described in the article referred to, is working out very well at this plant, although whether it might do so well under other conditions may be fairly questioned. Mr. Odenbach has the method thoroughly systematized and his men are trained to handle the trucks under the unusual condi-

tions in which they operate. The quarry is working night and day, flood lights being used at night.

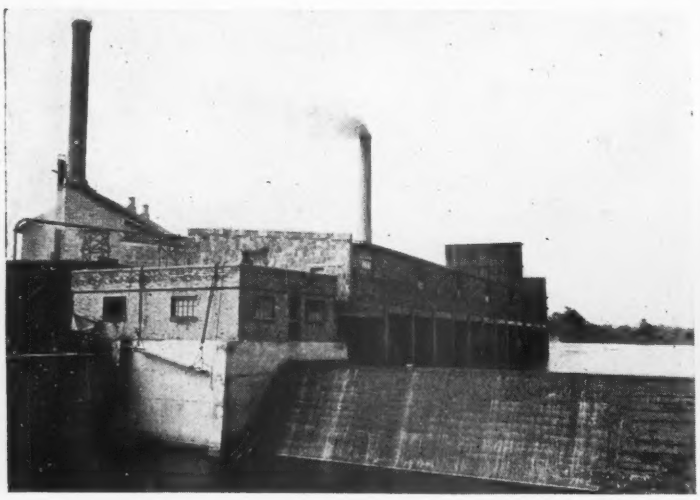
Beyond this plant is the plant of the Brittain Stone Co., Ward Brittain, manager. The unusual feature of this operation is that it has no quarry, the stone being waste rock which was excavated in digging the New York barge canal. It is a silicious limestone, rather hard to break, and not so different from one of the rocks was described in ROCK PRODUCTS for March 22, 1924.

The new plant is unusual, as one side is built on a long radius curve to conform to the railroad track. The other side is straight. Along this straight side is placed the block machine which was turning out blocks when we saw it as fast as two men could take them from the machine. New kilns for curing were partly completed and partly under construction. At

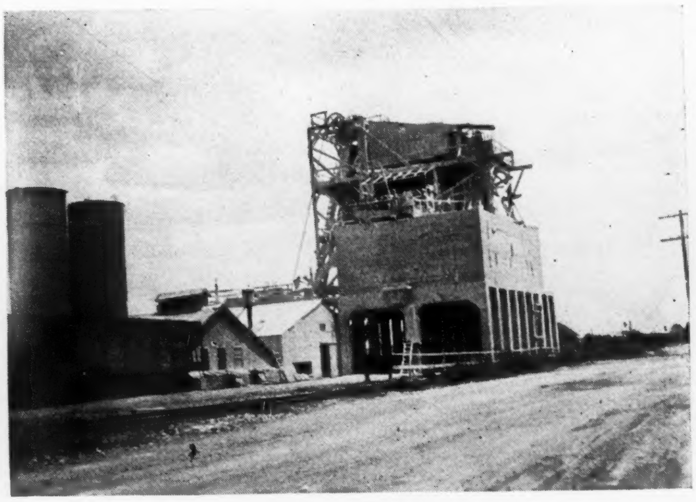
The last plant visited on this trip was that of the General Crushed Stone Co. at Le Roy. A. L. Scott, the manager, and Frank Jones, production engineer, showed some of us about the plant, while John Rice and O. M. Graves, executives of the General Crushed Stone Co., took charge of other parties. The plant is an excellent example of the stability that may be given to an operation by designing and building right in the first place.

Dolomite Products Co. plant near Rochester, N. Y.

Brittain Stone Co. plant using Barge Canal stone



New block plant of the Ebsary Gypsum Co., Wheatlands, N. Y.



Plant of the Le Roy Lime and Stone Co., Le Roy, N. Y.

sometimes called trap in central Pennsylvania. It is in fact suitable to the uses to which crushed trap rock may be put.

Gypsum Plants

Beyond this a considerable distance the road ran by two important gypsum plants, that of the Empire Gypsum Co. near the old Wheatlands church, and the plant of the Ebsary Gypsum Co. near Wheatlands station, about three miles farther on. I drove out on the following day to see the new block plant which this company is just completing.

ROCK PRODUCTS readers may remember that this company had a block plant at Garbutt, which is not far from the Empire plant. The Ebsary block plant burned last year and the new plant has been erected near the gypsum and plaster plant which one end of the building is the hand molding department in which the thicker blocks are made.

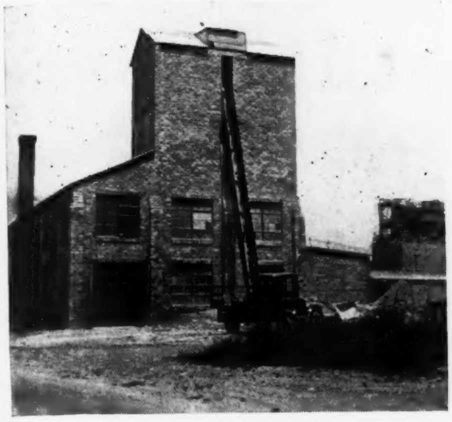
Among other improvements made since the plant was visited something over a year ago was a sand dryer and sand storage equipment.

At Le Roy the entire party made a short visit to the plant of the Le Roy Lime and Stone Co. and we were entertained by J. L. and Frank Heimlich and their associates. This is a splendidly built and equipped plant. Everyone was interested in the new cement products plant of this company which is operated by a subsidiary known as the Ribstone Concrete Corp. Both building blocks and units for making silos are made, the company rather specializing in silo units. A new block machine had just been received and was to be installed at once.

It was erected in 1915 and is still functioning well and has many years of useful service before it. All the surroundings are exceptionally neat and well kept.

Business Good Around Rochester

Business in the mineral aggregate line is very good around Rochester this year. George Schaefer, the sales manager for the General Crushed Stone Co., said he could hardly ask to have it any better, and the way the telephone calls came in while I was in his office was confirmation enough of what he said. Business ought to be good there. Driving in and out of the city, numbers of new structures were noted, and I was told of many improvements that have been planned for the near future which would use rock products in abundance. Rochester is growing fast. One of its busy corners



New cement products plant of the Ribstone Concrete Corp., subsidiary of the Le Roy Lime and Stone Co.

The Economics of Soil Liming

A THOROUGH and comprehensive treatise on the economics of lime treatment of soils is presented in "The Economics of Soil Liming" by John A. Slipher, recently issued as a reprint from *Journal of American Society of Agronomy*, Vol. 17, No. 4, April, 1925. All the costs entailed by liming are taken into account and averages for the different items entering into the whole cost are made, based on the statistical surveys. The actual costs involved are: initial cost of the lime or limestone, freight charge, wagon haul cost, spreading cost, and harvesting cost of crop increase. Each of these items are considered separately and sub-itemized. The gains from liming are then considered. These advantages or profits are: economy of operation, capital or land profits and crop profits. These gains are dependent on a number of factors such as the nature of the soil, the geographical location, the kinds of crops and methods of lime or limestone application. Several tables are given to compare results obtained from different crops, on individual soils and under various rates of application.

In summarizing, some of the points chosen as outstanding with reference to the economic aspects of liming were:

A true economic appraisal of liming must comprehend all elements of cost and outlay as well as all forms of gain secured.

The first gain from liming is in the economy of operation secured. Speed and efficiency of tillage is measurably improved, cutting the cost of production. Lengthening of the growing and working season is an item contributing to the increased efficiency.

Capital or land profit is the second gain from liming. One dollar net return in crops per year justifies $10 higher land value. This profit for the country as a whole is $40 per acre, based on the returns from tests in 17 states.

The third form of gain is the crop increases. Their value is sufficient to afford a net profit of $4 per acre per year.

Considered as an investment, liming has returned 138% on all outlay in the 17 states studied.

Root and legume crops contribute the highest profits from liming. Cereals give the least return although this is as much as $1.70 per acre.

Geographically the highest earnings come in the eastern states.

Returns from liming follow the law of decreasing returns. Thus light rates of application proved the best investment in 13 comparative tests.

Labor and finance factors are adverse to heavy rates of application of lime.

Le Roy plant of the General Crushed Stone Co., Le Roy, N. Y., the neatest stone plant of all

is said to be the fourth busiest in the United States.

At Albany I went to see the new plant of the Albany Crushed Stone Corp. which was put in production only a short time ago. It is a fine plant and a good example of utilizing gravity and a hillside to put the material through the plant without elevating it. The quarry face has been opened for 2600 ft., and as it is 110 ft. high, there is an abundance of stone available for large scale production. J. Harris Loucks, the head of the company, drove me out and the visit was an interesting one in spite of the rain which cut it short.

Every one of these trips impresses me with the way the rock products industries are evolving, with better methods of material handling coming constantly to the fore, and plants of a better type constantly being built.

The Albany Crushed Stone Co. plant near Albany, N. Y., which has recently been put into operation on a large scale

Relation of Clover Failures to Need of Lime

THE National Lime Association, Washington, D. C., has issued bulletin No. 179 on "Clover Failures and Their Relation to the Need of Lime" prepared by R. C. Towles, soil technologist of the association. The importance of clover or some other legume in the rotation of crops to furnish organic matter and nitrogen, thus maintaining soil fertility is discussed. The fertility values of different legumes are compared. Clover is selected as the ideal soil builder. The causes of clover failures are discussed. Most of these failures result from the lack of lime. This statement is substantiated by statements by a number, of authorities based on experimentation. Small amounts of lime applied at intervals, preferably twice in the rotation ahead of the wheat and after the clover.

New York State Crushed Stone Producers Meet and Enjoy Themselves

Visit Le Roy Plants—Development of Association Work

THE regular monthly meeting of the New York State Crushed Stone Association was held at the Le Roy plant of the General Crushed Stone Co., on Friday, June 26. It is the pleasant custom of this association to hold meetings at the plants belonging to the member companies in turn, which give the meetings an educational value beyond what they would otherwise have. The next meeting is to be held at Chaumont, N. Y., at the Adams and Duford Quarry, at the invitation of E. B. Johnson.

The party drove out from Rochester, about 26 miles and on the way a number of the party visited the quarry of the Dolomite Products Co., which is just outside of the city (see Rock Products, April 18, 1925). A visit was made by the entire party to the plant of the Le Roy Lime and Stone Co., at Le Roy. Everyone was interested in the new cement block plant which has recently been installed there, and which is run by a subsidiary company called the Ribstone Concrete Corp. This concern specializes in the making of a special unit for constructing concrete silos.

Then the party drove to the Le Roy plant of the General Crushed Stone Co., and divided into groups, each accompanied by one of the officials of the company, who could explain the work in detail. While the Le Roy plant is not new its flow sheet is thoroughly modern and its equipment excellent. And in neatness it surpasses any that the writer has seen to date. It has the reputation of being the neatest and best kept plant in the state and it was the judgment of those who saw it that the reputation was deserved.

A picnic dinner was served at a hunting lodge a short distance from the plant. This lodge is a log cabin said to be a hundred years old. There is a well kept lawn in front of it and there, in the shade of the trees, the tables were laid. "Bill" Anderson, of the Hercules Powder Co., acted as chef and host. The menu included steamed clams, fried chicken, fried fish, potatoes au gratin and ice cream, and one remembers a fruit punch of exceeding savor.

After the dinner the meeting was called to order by President Sporborg and the serious business of the day began. It was first voted to hold regular meetings each month. Then Otho M. Graves, who is president of the National Crushed Stone Association, explained how necessary it seemed to him that the National and State Associations of crushed stone producers should undertake engineering research work to promote the use of crushed stone, especially as a preferred concrete aggregate. Mr. Graves said he had been much impressed by what other associations of the kind were doing to promote the use of their products in the most legitimate and commendable of ways; that is by showing that such use was both economy and sound engineering practice. He thought that crushed stone had so many advantages over competitive materials that these advantages ought to be brought out, both by research and the collection and publication of the immense amount of material that was the result of research already undertaken.

New York State Crushed Stone Association, Le Roy, N. Y., June 26

The members spoke in turn upon this subject and all favored endorsing and supporting the National Crushed Stone Association should it undertake such work. It was voted to send a committee to Pittsburgh, Penn., to attend the meeting of the Western Pennsylvania Crushed Stone Association on June 30, at which meeting there was to be present also a committee from the Eastern producers' association, all of these to consider ways and means for carrying out the work. After this action was taken the meeting adjourned.

The companies represented and those who represented them were:

General Crushed Stone Co., John Rice, O. M. Graves, John Rice, Jr., A. L. Scott, Frank Jones, Grover J. Murphy, and Geo. E. Schaefer.

Le Roy Lime and Stone Co.: J. L. Heimlich, Frank Heimlich, Augustus W. Rogers, Frank Howe.

Rock-Cut Stone Co.: W. L. Sporborg, A. G. Seitz, and F. C. Owens.

Dolomite Products Co.: John H. Odenbach, Frank Waddell.

Utica Crushed Stone Co.: F. E. Connelly, Grant A. Hunter.

Buffalo Crushed Stone Co.: James Savage.

Morris County (N. J.) Crushed Stone Co.: F. W. Schmidt.

Adams and Duford Co.: E. B. Johnson.

Solvay Process Co.: W. E. McNesser.

Warlock Stone Co.: Mr. Ellis.

Brittan Stone Co.: Ward Brittan.

Wickwire Steel Corp.: W. E. Foote.

Albany Crushed Stone Co.: J. Harris Loucks.

The guests were: W. Anderson (Hercules Powder Co.), W. Whitlock (Union Explosives), Edmund Shaw (Rock Products).

The New York State Crushed Stone Association was reorganized about a year ago with W. L. Sporborg as president and George E. Schaefer, secretary.

This is a case of adjournment from refreshment to labor, instead of vice versa; who would not attend a meeting with such a setting?—New York State Crushed Stone Association

Brandon Rock Products Corporation, Brandon, Vermont

JUST east of Middlebury, Vt., is located an extensive deposit of pure white marble. It is just the same texture as the famous Italian white Carrara marble.

Several fortunes have been sunk here in an attempt to recover dimension marble. Some few sound blocks have been recovered and these have mostly been used for statuary purposes. Nature fractured this deposit, but for producing "Granito" for terrazzo and stucco dash, the more fractures the better, as it saves crushing expense.

Some time ago a modern crushing plant was erected and on May 1, 1925, the operation was taken over by the Brandon Rock Products Corp., which has been very successful with their English cream and English pink stone for terrazzo and stucco.

The quarry is a pit operation and the stone is lifted out of the pit with a derrick using two ton steel skips. The stone is dumped into an Allis-Chalmers Gates crusher type K-5. Then it is elevated to a revolving screen and the oversize sent back to the gyratory crusher and the fines sent to the finishing screens. The 1-in. material is stored in a bin and automatically fed to a set of Sturtevant crushing rolls. Then raised by a Sturtevant self-contained elevator to the finishing screens. The oversize from these screens goes back to a set of small crushing rolls, which discharge into the same elevator as the larger rolls.

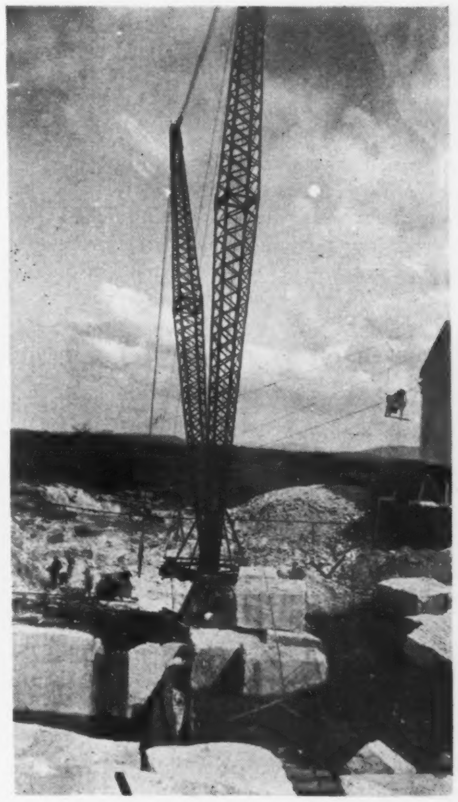
The very fine material is now thrown away, but it is the intention of the Brandon Rock Products Corp. to install a fine grinding department as soon as desired.

The company owns its own power equipment, getting its high tension current from the Hortonia Power Co. The plant is driven by three 50-h.p. General Electric motors.

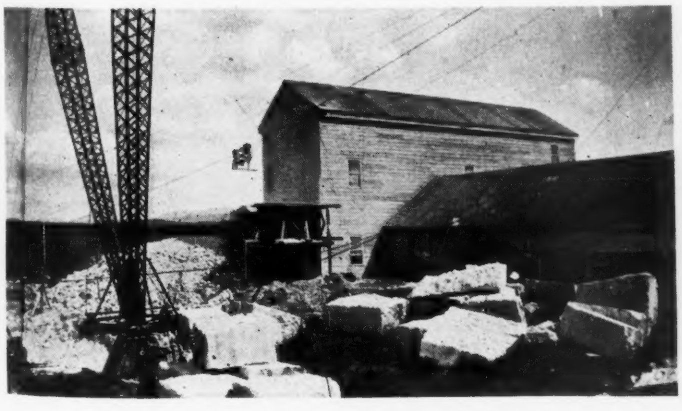
An extensive advertising campaign is being planned to acquaint the architects and large builders of the superiority of "Middlebury White" as a stone for hospital and public building floors. The stone is said to be absolutely non-absorbent and its wearing qualities are claimed to be superior to any other stone being offered in the market.

Wm. Rockwell, president of the Brandon Rock Products Corp., is in general charge, with Wm. A. Selts, assistant, in actual charge of operation. E. C. Rockwell is in active charge of sales and publicity.

The offices are at Brandon, Vt., in the Brandon National Bank Building.



Quarrying white marble at Brandon, Vt.



Another view of quarry and crushing plant

Terrazzo plant of the Brandon Rock Products Co.

German Opinions on and Experience With Super-Portland Cement vs. Alumina Cements

Shall Quick-Hardening Cements Be a New Product or a Modified Portland Cement?

By R. W. Scherer
Western Lime and Cement Co., Milwaukee, Wis.

IN view of the fact that alumina cement has been introduced in a commercial way in this country and further exploitation is contemplated, it will be interesting to note the experience, both in manufacturing and marketing in Germany with this material and with the superior portland cement, which has been on the European markets for a year or more.

Unlike American manufacturers, the Germans have always distinguished between true portland cement, slag cement, and iron cement to the extent of maintaining separate associations for each type of product. Whatever danger the present manufacturers see in the advent of quick-hardening alumina cement they are prepared to meet it (especially the portland cement makers) with a quick-hardening portland cement, that seems to do everything that is expected of the new cement.

Of the present status of manufacturing superior portland cement, Dr. Haegermann has to say *(Zement*, November 23, 1924): "Within a year the manufacture of superior portland cement has been taken under advisement by most of the companies, and about 20 cement mills have actually gone into manufacturing it on a commercial scale. By June, 1924, there was an overproduction; the demand, even in comparison to that of ordinary portland, was light, so that several discontinued the manufacture of the quick-hardening, or so-called superior cement. The cost of manufacture is substantially greater than that of ordinary portland cement. Storing deteriorates the cement so that moved at the price of the ordinary product would entail a considerable loss.

"Fortunately there has been a marked change recently; there is now a satisfactory demand with every indication that it will increase. Every new article requires a certain length of time to be introduced; the consumer must be convinced of the advantages. In a very short time superior portland cement has received a very favorable reception and contractors have learned to appreciate the advantages in working methods. The 20 per cent difference in price which is necessitated by harder burning of the clinker, the use of the best coal and finer grinding is considered as justified, the more so since there has been cause for disappointments in past experiences with the cement.

"At present 15 mills are producing this class of cement and seem able to supply the demand. As regards processes and kilns used at these mills, it is interesting to note that half of them are equipped with the wet process using rotary kilns, a few with rotary kilns using the dry process, and finally even vertical kilns and one circular kiln (Ring Oven) are represented. That the circular kiln proved suitable for this purpose is not so remarkable but it is rather fortunate that the attempts with vertical kilns proved successful.

"On account of the easy grinding, fineness of the finished product is carried to an extreme (one sample shows 3.7% retained on the screen having 10,000 meshes per sq. c.m., a screen approximately equal to 250 mesh per linear inch). These modified portland cements all attain compressive strengths of 250 to 370 kgr. per sq. centimeter in 3 days and all are well above 500 kgrm. in 28 days. These 3 days' results are considered amply high and at 28 days the tests compare favorably with the best of standard portland cements. It should be noted that test prices are stored in water kept at a temperature of 16 deg. C. (54 deg. F.). The temperature influences the results at 3 days much more than those at 28 days."

Dr. Haegermann, from analysis of these modified portland cements and well grounded computations, claims that they can be produced at any portland cement mill by the addition of 5% of bauxite, and not necessarily very pure bauxite. There seems no doubt that they fulfill all the requirements of a quick-hardening cement.

Super portland cements and alumina cement are then competitors on work where rapid hardening is desirable. Discussing the possibilities of these competitive products Dr. Paul Hensel *(Ton Industrie Zeitung*, November 19, 1924) writes as follows: "Dr. Adolph Spengel has shown that by a proposed change in process the cost of alumina cement can be reduced to about two or two-and-a-half times that of standard cement. The process contemplates the simultaneous production of aluminum and alumina cement, utilizing a proportion of alumina in the expensive bauxite that is not available for the conversion into metal, but can be used in the cement. Even if the proposed process would cheapen the product as is hoped, to two or two-and-a-half times the cost of standard cement, Dr. Spengel's far-reaching conclusion that super portland cements would disappear is in no way justified. Super portland cements do not cost anywhere near twice as much as standard; in fact, never exceed it by more than 25%. The advantages to the user, under the present status of the building industry, is the same for the modified portland as for the new cement. Super portland cement, in two days hardening, reaches and exceeds the 28-day strength of standard cement. However, with regard to removing centering or forms from structures, this high initial strength can not be turned to account with either portland or alumina cement. As formerly pointed out by me, the failure of concrete slabs, tested two days after placing was not due to parting of the concrete but to exceeding the modulus of elasticity of the reinforcing steel. This fact has led to tests in which a higher grade of steel was used. These have been undertaken at the German High School at Prague; results which are to be published shortly are very favorable and can be expected to point the way for further use of super portland cement.

"With the modified portland it was possible to construct a four-story building from the time of breaking ground to raising of the roof in 36 days. At that the

cost of the cement was far less than twice that of standard cement, and the same conditions obtained as to reinforcing and proportioning the concrete. Also in street work the modified portland will prove as satisfactory as its new competitor.

"The fact that super portland does not attain the one and two-day strength of the alumina, does not alter the case, because the rate of building can not be altered to utilize the one-day strength. Furthermore it does not seem possible to utilize the one-day strength of alumina cement by leaner concrete mixtures. Tests to determine this are in progress.

"Since the alumina cement at best costs twice as much as the standard article, as it is far more costly than modified portland cement and both are of equal value, the former can not be considered as a competitor in the building industry, but must rather seek a market on account of its high resistance to acids."

Taking up the argument on behalf of the alumina cement, Dr. Adolph Spengel replies as follows: "In a former treatise I have pointed out that high class bauxite is not essential to the manufacture of alumina cement, that a mineral rather low in aluminum oxide fills all requirements. On the other hand, in the refractories industry, iron oxides, causing shrinkage, are undesirable, so that the new cement does not compete in the bauxite market either with the refractories industry or aluminum manufacture. Deposits suitable for cement are of frequent occurrence, at least outside of Germany, and in one case, at least, are found in conjunction with limestone.

"The reason why these deposits have not been utilized for the recovery of aluminum is that only free bauxite can be used in this process, that is aluminum nitride or sodium aluminate, while other combinations of the metal are still available for cement manufacture so that the manufacture of cement in conjunction with aluminum recovery would effect a great economy in both.

"The technical results attained with super portland cement, as well as the practical tests are gladly conceded, but I do claim that it is possible to produce a building material, abundantly able to compete with super cement, and one which will have the inestimable advantage of not competing with itself in a special grade of the same goods. I doubt whether far-reaching utilization of the good qualities of super cement will be to the interests of the portland cement manufacturers. Indeed, as the use of any special cements increases, the use of the standard product must decrease, and as the knowledge of super portlands increases, the value of our present standard cement must decline in the estimation of the public. I am convinced therefore that cement for special purposes can safely be left to the alumina cement."

Conclusions

1. In Germany the new quick-hardening alumina cement has an active competitor in modified so-called super portland cements.

2. That both are equally suitable for building and road construction is conceded.

3. Super portland cement can be manufactured with less than 10% of low grade bauxite and will cost about 20% more than standard.

4. Alumina cement at present costs twice as much as standard, but it is claimed low grade bauxite can also be used and competitive costs can be reached.

5. The demand for quick hardening cement has been proved. Shall it be left to alumina cement or shall portland cement create its own competition and recognize two standards?

Using High-Alumina Cement as a Macadam Road Binder

As has been noted in Rock Products and other journals, *ciment fondu*, the French high alumina cement is being tried out in England as a binder for macadam roads. For light traffic the method seems to be succeeding well. The following account of its use and the method of application is from the British paper, *Roads and Road Construction*:

"In the early days of 1924 some experiments were made in Kent to bind the surface of a macadam road, using one of the brands of aluminous cements mixed with sand as a binder in place of the usual fine material, and water spread and rolled into the interstices of the stone, which was previously rolled in dry to a firm bed before using the binding grout.

"This attempt to improve the surface of a macadam road, while not perfect, was sufficiently promising to the engineers in charge of the work to decide them to make another trial with some improvements in method on the part of the macadam road. This trial was so successful as to strength of the finished surface and low cost of the work that the method was, with further developments, taken up by Mr. W. B. Purser, County Surveyor for Lincolnshire, who decided to make a thorough test of the process by constructing a section on the main road between Lincoln and Grantham, some 200 yd. long and 20 ft. wide, which section was completed in June, 1924.

The old macadam was scarified, regulated in thickness and rolled, then new charnwood granite, broken to a 2-in. gauge, was spread 3 in. thick and the surface shaped and dry-rolled with a steam roller to a thorough consolidated hard and even bed ready for binding together.

The binder, consisting of one part of aluminous cement to seven parts of fine granite chippings and sand thoroughly mixed together dry, was spread to a thickness of ½ in. over the surface of the granite. It was then watered by means of a water cart with spray delivery, and the binder brushed in with brushes by exactly the same methods as is used upon a waterbound macadam road, and rolled again with the steam roller until a satisfactory finish was obtained.

"This portion of the road, after a year's use and the testing effects of a wet summer and winter, has a surface as good as the day it was finished, and there has not been a single loose stone found during this period, the surface forming a good foothold for horse traffic.

"Lincolnshire, being mostly an agricultural county, the traffic on this road is not very heavy, but amounts to about 600 tons daily, making a total of about 150,000 tons (of which three parts is motor traffic and one part horse traffic), has passed over the road since completion, the surface remaining in perfect condition without any cracks or potholes being formed, and no repairs have been done to it up to this date.

"Recently a similar road has been constructed near Glasgow, and one is now under construction on a portion of the main road between Aylesbury and Buckingham, about 400 yd. long by 21 ft. wide.

"The writer was invited to inspect the construction of this road during the first week of April, 1925, and found the method of construction was carried out upon similar lines to that used by Mr. Purser, with what may be termed minor improvements, and are described as follows:

(A) Scarify the surface of the road, even up to a proper camber and roll this surface with a steam roller.

(B) Spread the new two-inch granite to the required thickness and camber and dry roll to a thorough consolidation.

(C) Prepare the binder of aluminous cement in the desired proportions with clean sharp sand in the proportions of one part of the cement to seven parts of sand thoroughly mixed four times dry.

(D) Spread the mixed dry binder about ½ in. thick over the surface of the rolled granite.

(E) Sprinkle the spread binder by means of a water tank cart to a slurry and sweep it by means of brushes in every direction over the surface to fill the voids in the granite.

(F) Roll again with the power roller to thoroughly consolidate to a finished surface.

The final rolling of the surface is necessary to press in stones swept out in spread-

ing the slurry, and this is the crucial point of the whole process, because if too great a quantity of water is used and the slurry made too thin its penetration into the voids between the rough cubes of the granite causes a flotation of the aggregate when the roller is being used to bed the granite again, and this prevents an even top surface being made without hollows to the required camber.

Other experiments have been privately attempted to improve this method of constructing a really cheap road crust that will carry a fair weight of traffic and resist weather conditions. Among other efforts, laying the mixed binder wet over the re-shaped base and spreading the new aggregate over the mortar in the hopes it would rise when rolled to fill the voids has been tried. The failure here was that the weight of the heavy power roller caused the mortar to squeeze up on to the surface, and the mixture stuck to the wheels of the machine, making the work impossible.

It has been suggested that the fine and coarse aggregates with the binder should be mixed dry, laid, rolled, and then watered and rolled, might be satisfactory but this is too close to proper concrete methods, and, while the writer hopes to supervise a test of constructing a road with semi-dry concrete so that it may be rolled to a dense bed and be cured by a ponding method to eliminate water voids and make the resulting concrete practically impervious, he believes both methods would be much more costly than the one under review.

The addition of a quick setting binder to the ordinary methods of forming a water-bound macadam road is the cheapest improvement yet discovered in roadmaking, if only for its usefulness in binding a sub-base to carry an asphalt carpet as a surfacing for main roads and as a finished surface crust for second-class roads.

It is cheap. For a 4-in. top cover a cubic yard of mixed aluminous cement binder mixed 1 to 7 would bind 50 super yards. In the proportions of 1 to 4 of this cement and sand the cost would be increased 25% over the former mix, but the strength would be increased 25% if properly applied, and traffic would have to be diverted a few days in either case.

Moroccan Portland Cement and Lime

THERE are at present eighteen plants in French Morocco, operated by Europeans, manufacturing cement and lime, with a total capitalization of Francs 21,001,000 (about $1,500,000), employing a total of 732 men, and using about 2250 horse-power of motive force. The total production is less than 10% of the amounts imported, but is steadily growing. In addition, a very large but unknown amount of poorer types of lime is manufactured in a small way by natives. There are also twenty three European brick making establishments, with a total capitalization of Francs 3,841,500 (about $200,000), employing a total of 250 men and using 317 horse-power in motive force. The total monthly output is estimated at a little over 2,000,000 bricks. In addition, there are 25 European establishments making floor and roof tiles of cement and similar mixtures, with a total capitalization of Francs 7,668,000 (about $400,000), employing 256 men and having a total motive force of 42 horse-power. Their total monthly output amounts to almost 500,000 tiles.—*U. S. Department of Commerce Reports.*

Results of Foreign Cement Research

IN ROCK PRODUCTS for May 30, there was published a report of the German portland cement manufacturers' meeting in Berlin in which reference was made to important developments in cement research. Some of these are further mentioned and elaborated upon in the Annual Report of the Society of Chemical Industry (Vol. IX, 1925) and others not mentioned in the report of the manufacturers' meeting are included.

It is concluded by E. Martin after a long research on the preparation and properties of calcium silicates that tricalcium silicate cannot exist in portland cement. The reasons for this conclusion are, unfortunately, not given in detail but the matter is so important that one hopes that such evidence as he has to offer will be published in full. The same experimenter claims to have obtained a hydraulic cement of the formula $5SiO_2 8CaO$ by heating hydrated silica and calcium carbonate to 1200 deg. C.

H. Kuhl, who has been experimenting with the ternary system lime-silica-iron oxide, has come to the conclusion that "under favorable conditions," which are not stated, alumina-free cements can be made "as strong as the best portland cements." The same investigator has been working with additions of flourspar to cement mixes. The addition of 5 to 10% of flourspar reduced the temperature required to burn to clinker from 1270 C. to 1100 C. This was one of the points mentioned in the report of the meeting referred to. It is said that a silicious cement with flourspar set very slowly but the corresponding alminous cement set rapidly. Cements which, when rapidly fired would not stand the boiling test showed no cracking when 5% of flourspar was added to the mix. The only disadvantage noted with the addition of flourspar was that of slow setting.

Turning from German to British sources: Pamphlet No. 3 of British Portland Cement Researches deals with the exothermic reactions in portland cement clinkering and concludes that the heat liberated by the combination of the lime silica and alumina, between 1100 and 1500 deg. C. is about 40,000,000 B.t.u. per 100 tons of clinker.

By substituting mixtures of glycerine and water for plain water, H. Pulfrich and G. Linck have investigated the setting of portland cement under the microscope. When 300 times as much water as the cement needed was used needles of calcium silicate and plates of calcium aluminate were formed. On prolonged storage these disappeared and a gel formed. With the proportion of water sufficiently reduced only a gel was formed. This would seem to confirm the observations of some other investigators, that under certain conditions the gel was formed immediately. According to these authors the best cement clinker corresponds to the formula $12CaO,Al_2O_3,4SiO_2$. This is very close to the formula given by J. E. Duchez in ROCK PRODUCTS for Aug. 11, 1923, which is $3.84SiO_2 + 0.99\ Al_2O_3 + 11.96CaO$.

F. Ferrarri found that a 1-4 mixture of quicklime and quartz, ground to the fineness of cement set in 10 minutes when gaged with water, in 9 hours when gaged with 2-3% of calcium chloride in solution and in less than five minutes when gaged with a 30% solution of calcium chloride, "becoming as hard as stone."

The corrosive effect of chlorine on mortar and concrete has been investigated by O. Gossner. He found an increase in volume which caused cracking, the end reaction being the formation of $3CaOAl_2O_3 2CaCl_2 10H_2O$.

L. A. Munro discusses the use of water glass on roads and factory floors, the effect of using small quantities in gaging being to make the concrete resistant to abrasion without lessening the tensile or compressive strength. A different result was reported in the meeting of the German manufacturers where it was stated that the addition of water glass lessened the strength and delayed the setting.

Catalysts for Reviving Dead Burned Gypsum

GYPSUM cements are at present attracting considerable interest especially in Europe. A report, by P. P. Budnikov and M. E. Levin, in Bulletin Institute Polytechnic Ivanovo-Vosniesensk, No. 8, 1924, on investigations of suitable catalysts for hydrating gypsum, shows, according to an abstract in *Chemical Abstracts,* May 20, 1925, that:

Suitable substances for this purpose include sodium hydroxide (NaOH), disodium hydrogen phosphate (Na_2HPO_4), sodium hydrogen sulphate ($NaHSO_4$), lime (CaO), aluminum sulphate ($Al_2(SO_4)_3$), ferric oxide (Fe_2O_3) and iron are inactive. Sodium hydrogen sulphate was the best catalyst. When finely ground dead-burned gypsum was treated with 1% $NaHSO_4 H_2O$, the results obtained were: tensile strength, 421 lb. per sq. in. after three days, 470 lb. per sq. in. after seven days and 700 lb. per sq. in. after 28 days. The best cement was obtained when the gypsum was calcined at 500° C. and ground to pass a 175-mesh screen. A "gypsum cement" can be made by mixing finely ground gypsum ($CaSO_4 2H_2O$) with an aqueous solution of $NaHSO_4$; this cement is dense, resistant to dampness, keeps its volume and can be mixed with sand.

Chicago Territory's Newest Sand and Gravel Plant

All Concrete and Steel Plant at Crystal Lake, Illinois, of the Wisconsin Lime and Cement Company Has Several New Things

By Gordon Smith
J. C. Buckbee Co., Consulting Engineers, Chicago, Ill.

THE past twenty years have witnessed few more remarkable developments than the ever-increasing use of concrete in construction work of all kinds. Cement production increased nearly six-fold from 1904 to 1924 and the production of sand and gravel for use as concrete aggregate road surfacing and railroad ballast has more than kept pace. Hand in hand with the increasing production have come more stringent specifications, particularly as to cleanliness and uniformity of sizing. This last has resulted in the virtual elimination of the "road side" pit and the use of pit-run sand and gravel.

Strange as it may seem, in view of this remarkable growth both in tonnage and value of output, there has not been a corresponding development in the methods of preparation of sand and gravel, other than in the size of plants and number of plants employed.

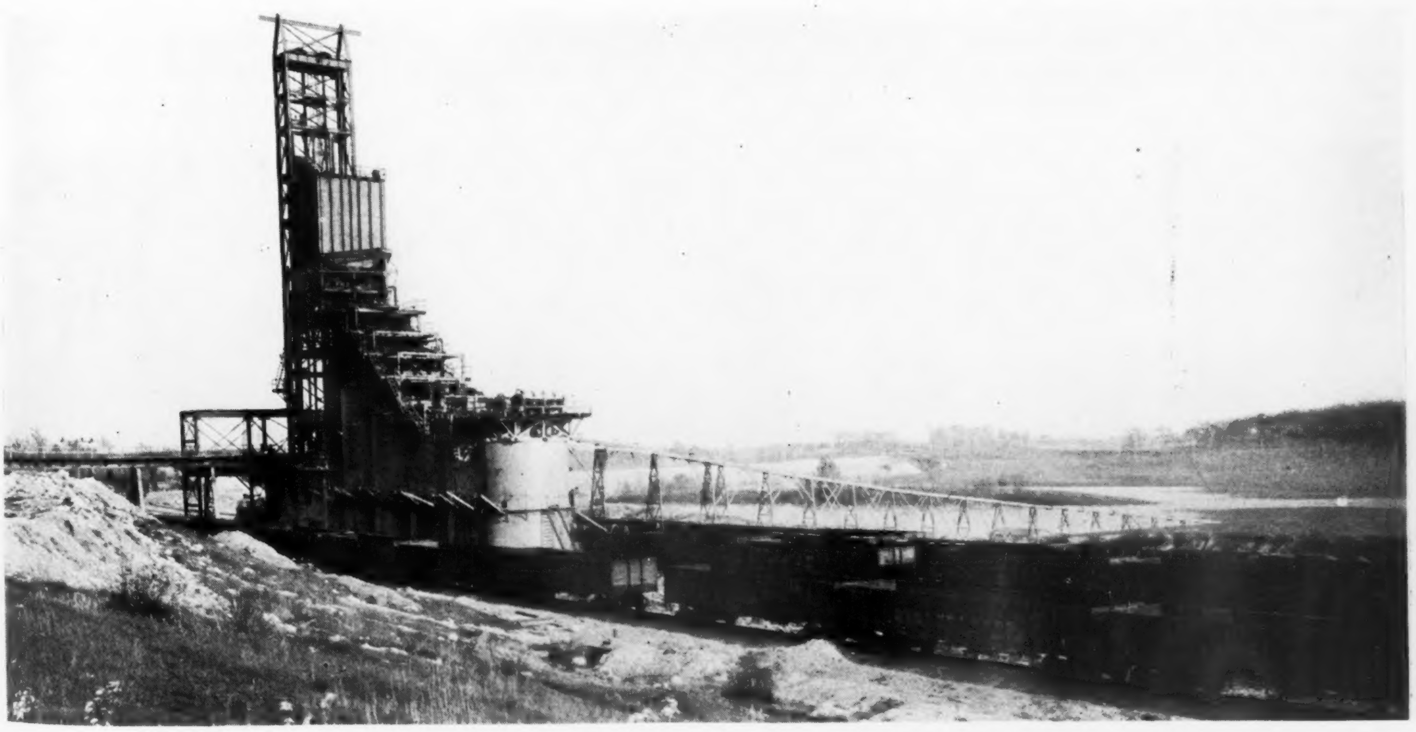
The conventional type of plant employs a track hopper into which the material coming from the pit is delivered. From this hopper it is conveyed on an inclined belt conveyor to the screening and washing plant. At this point the oversize material is rejected to crushers, which break up the large pieces, and the crushed material is then returned to the original hopper, where it mixes with the incoming material. The finer material at the point of the first separation passes through successive washing devices and sizing screens and is delivered to the bins below ready for loading into cars or trucks. This layout is sometimes varied by the use of a scalping screen between the hopper and the washing plant, which makes the first separation, the fines going on as before and the oversize being crushed and returned either to the hopper or direct to the scalper by means of elevators.

It is the purpose of this article to describe a plant constructed in 1924 under the direction of the J. C. Buckbee Co., engineers, of Chicago, that represents a great improvement on previous practice. The plant is that of the Wisconsin Lime and Cement Co., of Chicago, and is located in the famous Algonquin Valley gravel district on the Chicago and Northwestern Railway in McHenry County, Illinois. The property holdings total about 257 acres and are situated east of the railroad about midway between Cary and Crystal Lake, Illinois, and 40 miles northwest of Chicago.

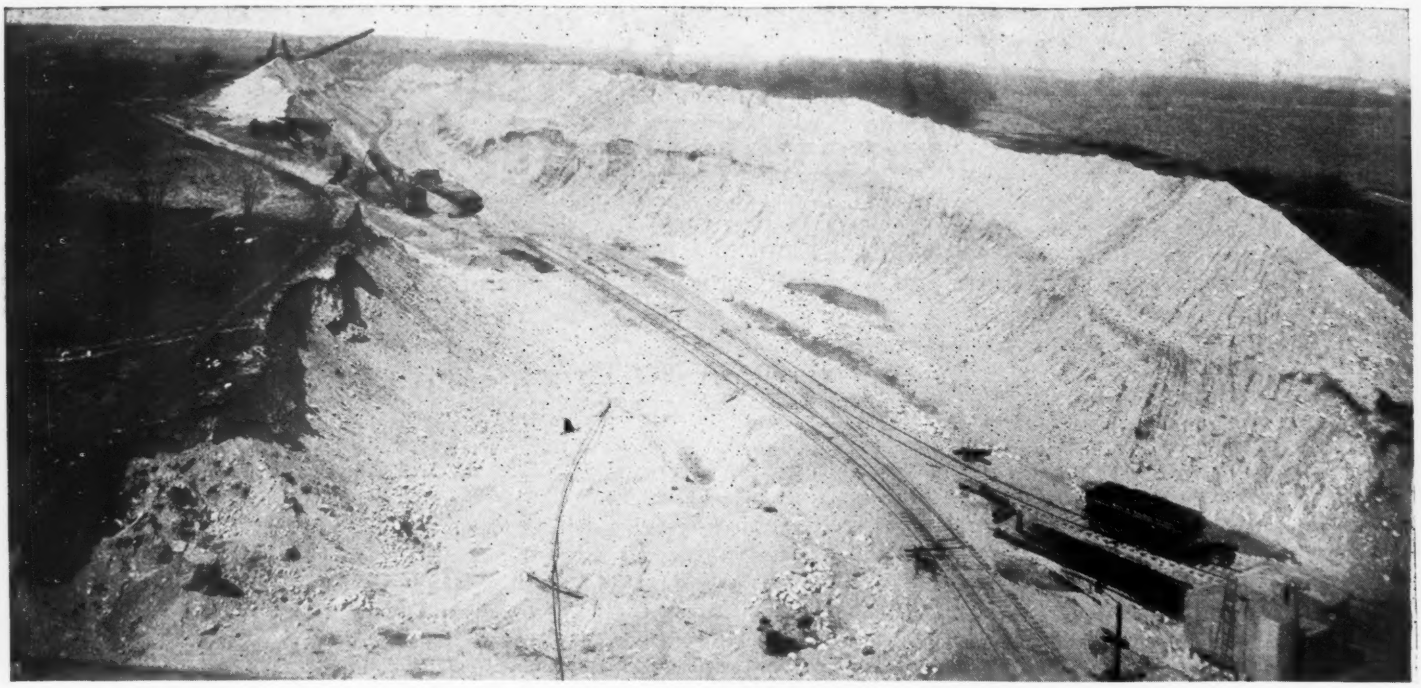
Nature of the Deposit

The gravel lies some 1800 ft. away from the railroad and is separated therefrom by low marshy ground. The deposit is a hill rising about 50 ft. above the track level and covering about 120 acres. Before the purchase of the tract the deposit was thoroughly test-holed and found to contain excellent material running nearly 55% gravel to a depth of about 50 ft., below which fine sand was encountered, which, with proper washing and sizing, produces excellent building or mason's sand.

To reach the deposit a fill was constructed across the slough nearly 1500 ft. to meet the higher level selected for the plant site. In the construction of this fill a 4-yd. Marion dragline excavator was used, having a 120



General view of the new Crystal Lake plant of the Wisconsin Lime and Cement Co., Chicago



General view of the deposit at Crystal Lake, Ill., showing method of opening

ft. boom. Upon completion of the fill and the laying of a track, the dragline was used in the construction of the car storage yard and the digging of a large artificial lake to insure an ample water supply for washing purposes. The dragline is now being used to thorough-cut the property and for stripping purposes.

General Equipment Facilities

The yard facilities are excellent, having ample room for over 120 cars. The company does its own switching, using a 40-ton saddle-tank locomotive for this purpose. The total trackage in this yard, including the lead from the main line, is over 8000 ft. A 100-ton, 50-ft. track scale is located about 500 ft. south of the plant and all cars are weighed at this point. A 25-ton Link-Belt locomotive crane with 50-ft. boom and 1½-yd. clam-shell bucket is employed in general yard service, unloading coal and stock-piling sand and gravel.

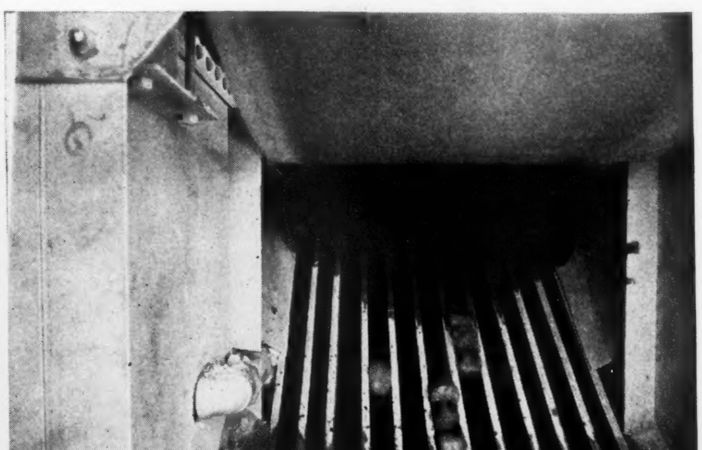
The material is loaded in the pit by a 140-ton Marion steam shovel, railroad type, using a 5-yd. dipper. The material is loaded into 12-yd. Western dump cars and a normal pit train consists of three cars handled by a 50-ton steam locomotive. The pit tracks are at a level about 25 ft. above the loading tracks and a spur connects the two levels. The cut through the property in which the shovel is now working was made by the dragline excavator which is now engaged in stripping. The overburden averages about 4 ft. over the entire project.

Work on this project was begun in November of 1923 upon arrival at the job of the excavator. The fill across the slough was completed during the winter notwithstanding the great difficulties encountered due to the cold weather and the treacherous nature of the soft bottom over which it was built. This fill has a maximum height of about 40 ft. and a top wide enough to accommodate two lines of tracks. A total of over 50,000 yd. of material were handled in making this fill, the work being done by the company's own forces.

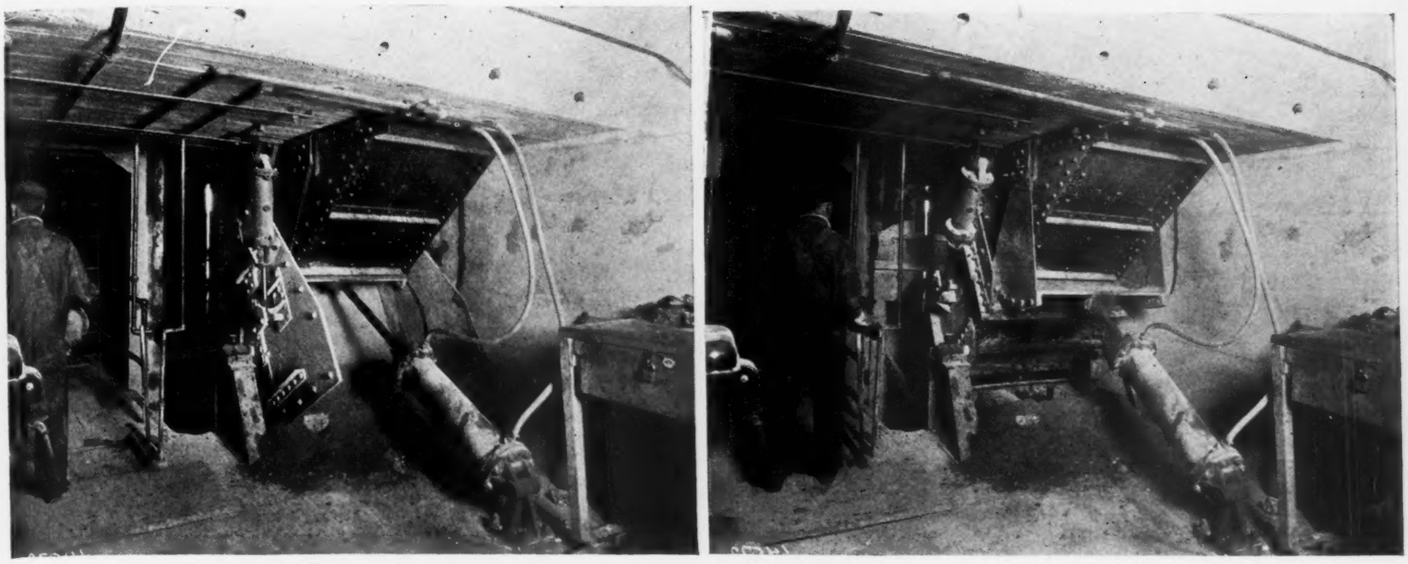
Constructed in Winter

Concrete work for the foundations, hopper and hoist room was carried on during the same period and completed in April, 1924. During the winter concreting, some of the work was done when the temperature was near zero, all aggregates were heated

Cars dumping in hopper at plant; a 9x20 grizzly makes the first separation at this point



Grizzly for removing over-size in chute leading from pan feeders at top of plant to first battery of rotary screens



Air-operated gate on skip-filling hopper—The view to the left shows gate closed; on the right, the gate open—Automatic in operation

and hot water used in the mixer. The concrete when poured was at a temperature of around 70 deg. F. and was kept warm after placing by means of salamanders placed near the work, the whole being covered with tarpaulins. Sufficient heat was supplied so that the temperature of the forms and concrete was not less than 50 deg. F. for ten days to two weeks after pouring. This portion of the work was carefully done and no concrete work was lost or damaged due to freezing or cold. The first steel was set about May 15 and the plant was turned over about the middle of August and was in full operation by September 1.

In laying out this plant which was designed for a normal, easy capacity of 50 cars daily, the J. C. Buckbee Co., engineers for the project, were actuated by a desire to eliminate two unsatisfactory features of the conventional belt conveyor type of plant, namely: the expense of renewing long and costly conveyor belts and the large area over which such plants are ordinarily spread. For a plant of this size of the conveyor type, the belts would cost around $5000 (including main belt and return belts for crushed material) and the life of such belts can hardly be expected to average over two years, making the annual belt cost around $2500. It will be seen that the elimination of this item results in a considerable saving in operating cost.

In belt-conveyor type plants of similar capacity, the distance between the receiving hopper and the loading bins is seldom less than 200 ft. and in many cases considerably more. This fact necessitates a plant site of some size and places one portion of the operating crew (belt feeder and hopper tenders) at a considerable distance from the washing plant crew and loaders with the crushing plant and its operators usually about midway between. Such a wide distribution of the plant forces obviously detracts from efficiency in operating.

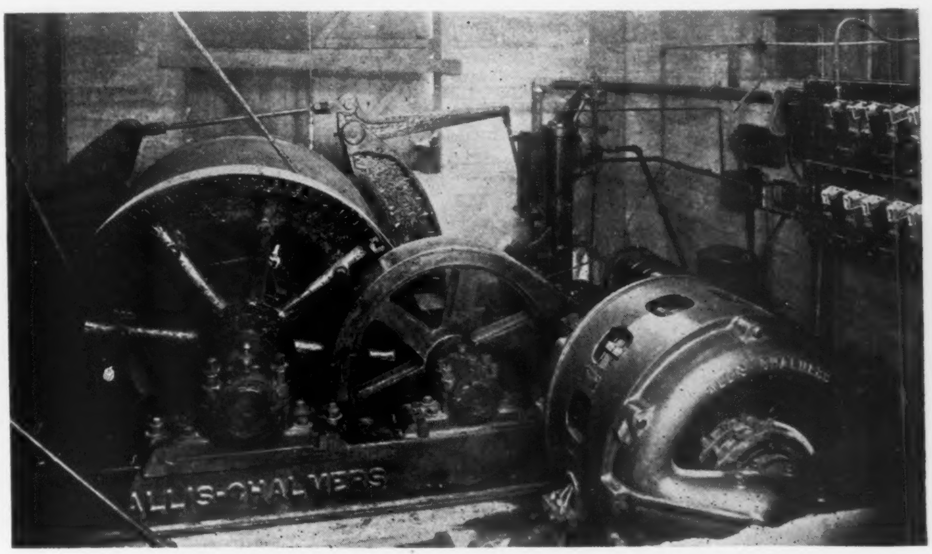
Skip dumping at top of plant

Skip-Type Plant and Why

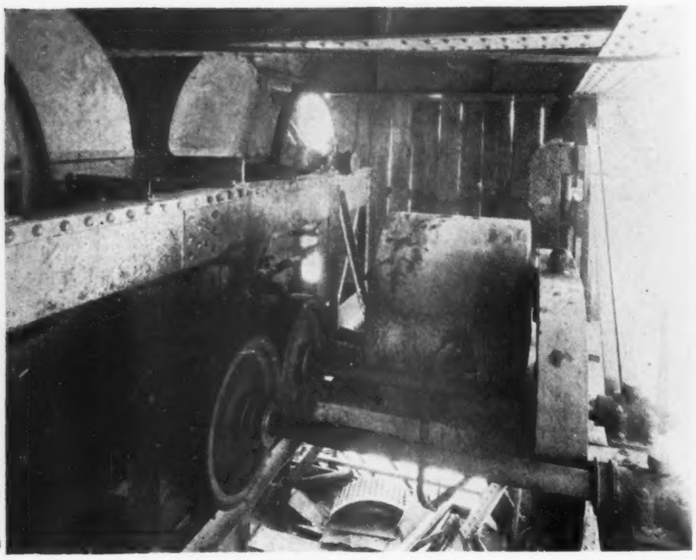
After careful consideration of the matter on the part of the engineers a skip type of plant was recommended and upon submission of preliminary plans and estimates, instructions were given by the owners to proceed with the work. Due to the concentration of loads in this type of plant and the elimination of fire hazards, it was decided that all structures be of concrete and steel. No expense was spared in making the plant a comfortable and safe place to work, and only the highest quality of machinery was considered. The result has been a plant that has far exceeded expectations in the matter of output and economy of operation. A detailed description of the plant and its operation follows:

Pit Operating Methods

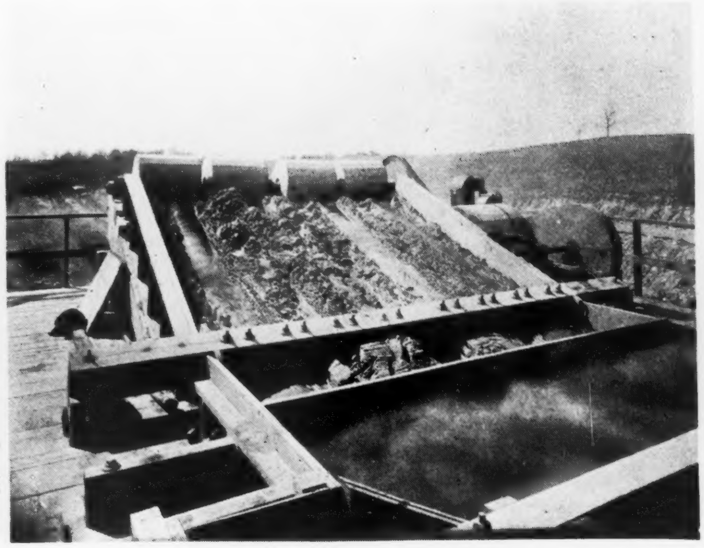
The 12-yd. side-dump cars bringing raw material to the plant come out of the pit at right angles to the plant loading tracks and



Automatically controlled electric hoist which operates the balanced skips



Chain drives on feeders



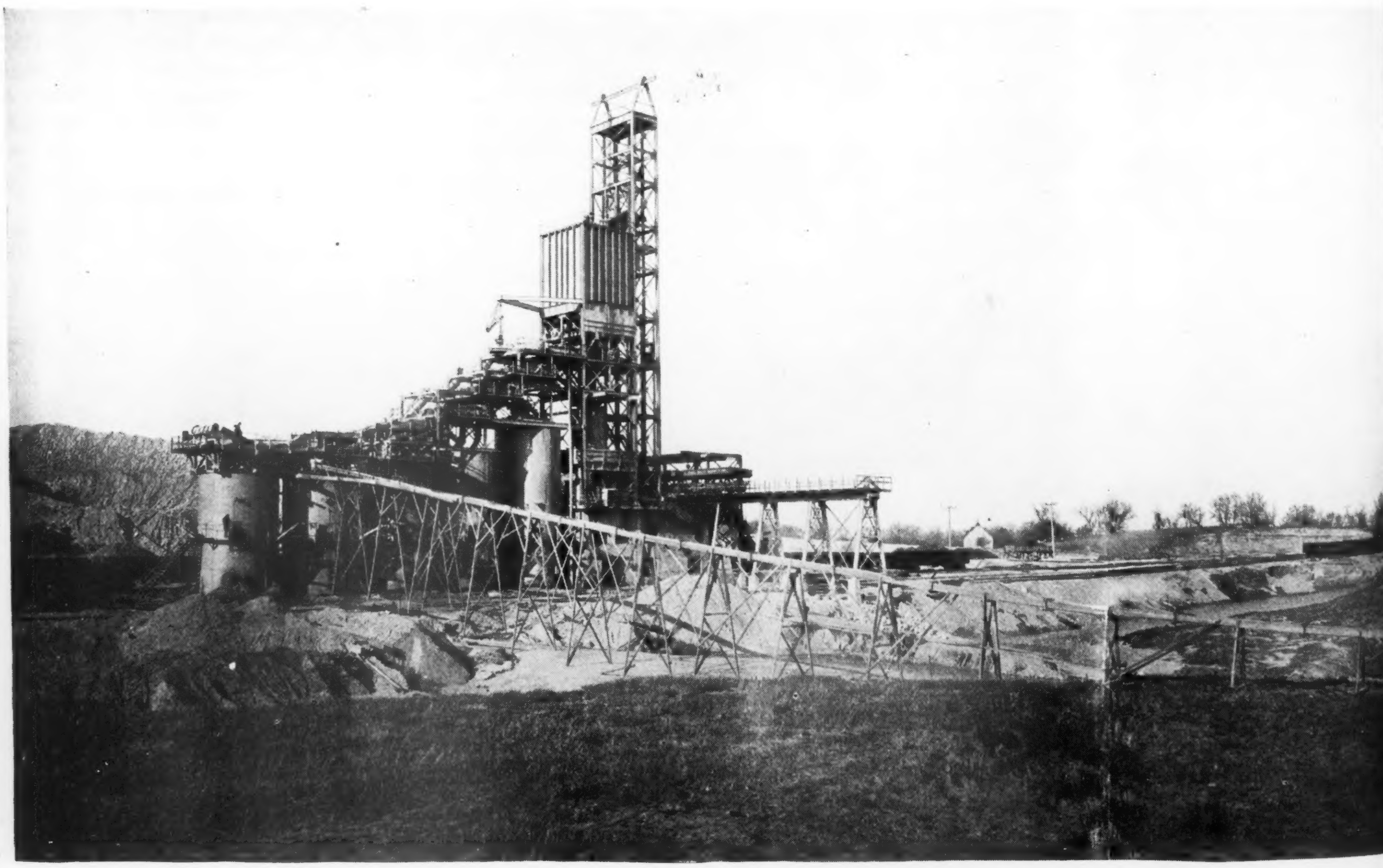
Sand-separating device of special design

at an elevation of about 25 ft. above them. The pit tracks are carried over the loading tracks on a steel trestle and over the concrete receiving hopper on steel girders. The pit cars dump away from the skipway tower over a grill of steel rails about 9 ft. long and 20 ft. wide. This grill is supported by the track girders and the hopper wall and is set on a slight angle, the rails being spaced to give a clear opening of about 6 in. The larger stones go over the grill and into the hopper of a No. 12 gyratory crusher. The fines pass through the openings in the grill and into the hopper from which the skips are loaded.

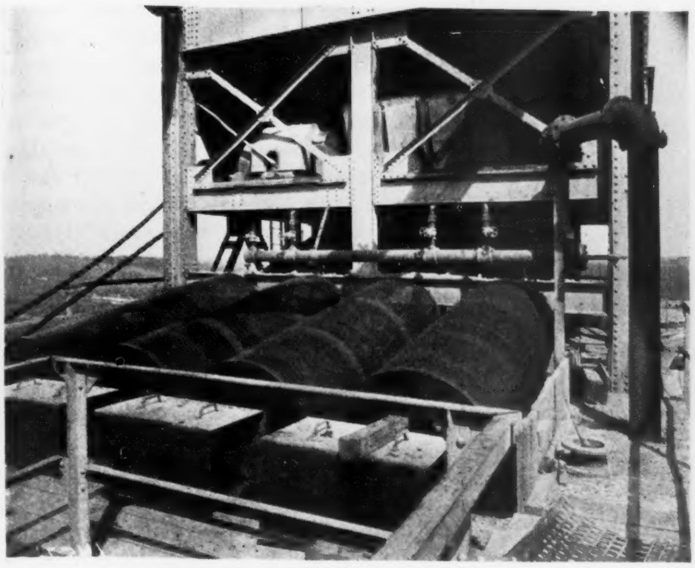
The product of the large crusher is carried up into the hopper by an inclined pan type elevator. The elevator passes through the inclined wall of the hopper and discharges into it, being protected under the grill by a heavy steel housing. The crusher is equipped with a clutch pulley and is driven by a 150-h.p. wound rotor motor. The elevator is belt driven from the crusher countershaft.

Automatic Skip-Loading Gates

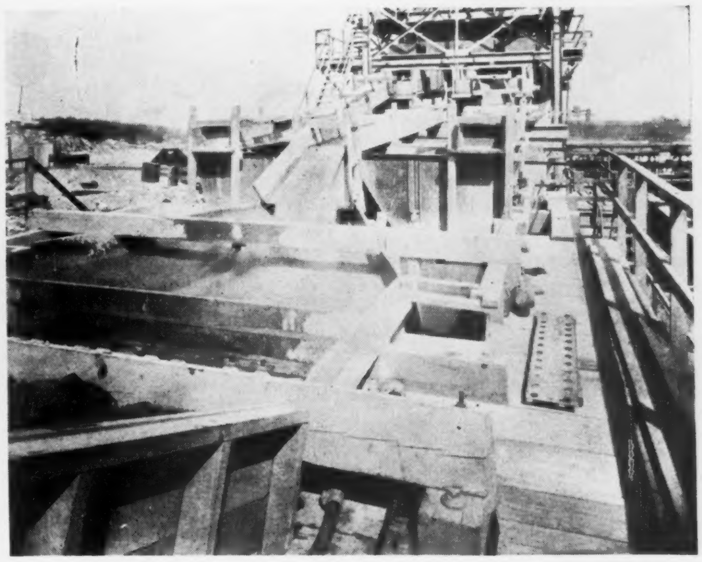
The skip-loading gates are located under the hopper and operated by compressed air. These gates are of the undercut quadrant type and were especially designed for this installation. The hinged spouts for loading the skips are lowered into position by the descending skips and are raised out of the way as the skips go up, these two operations being made entirely automatic by an



Panorama of plant showing waste flume and settling water pond; th



Top battery of 42-in. by 10-ft. revolving screens



Sand-settling tanks; screw dewaterer in foreground

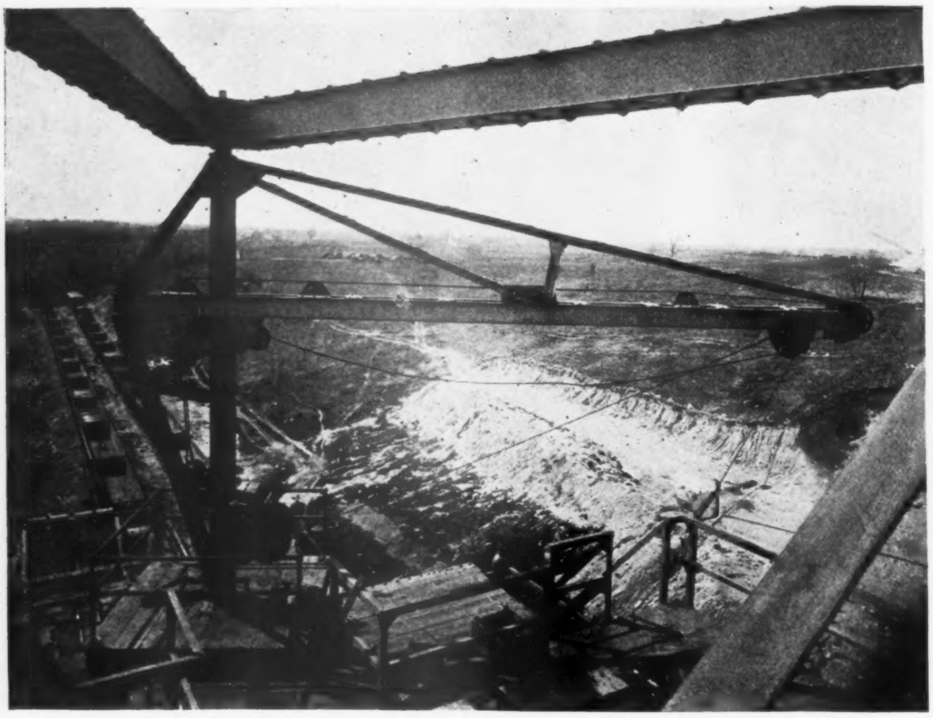
ingenious arrangement of levers and counterbalances. Compressed air for opening and closing the gates is supplied by an air compressor located in the basement under the operator's floor. This compressor is motor driven and entirely automatic in operation.

The skips themselves were designed expressly for the service required and are of all steel construction, having a capacity of 10 cu. yd. each and weighing about 12,500 lb. each. Each skip is supported on two steel cables and they operate in balance in a vertical skipway provided with oil treated guides.

As the loaded skip approaches the dump, a counterweighted device is engaged, the pick-up being such that the restraining effect of the counterweight gradually increases and compensates for the loss of load of the up-bound skip as the material is discharged and the skip inverted. This maintains an even pull on the main cables. The dumping action itself is remarkably smooth, and, owing to the careful design of the dumping arrangement and the bin, no spilling of material occurs and the skips dump and come to rest without shock to the structure, themselves or the hoist.

The hoist operating these skips is of the single drum, semi-automatic type actuated by a 150-h.p. motor through two sets of reduction gears. The drum is keyed to the shaft and served by a parellel motion, oil-operated post brake. The control is semi-automatic with time limit acceleration and arranged so that the hoist starts through

water intake and pump house is shown near the center of the panorama



Three-ton jib crane at top of plant for handling renewal and repair parts

closure of a master switch after which it automatically accelerates to full speed and near the end of the trip slows down and at the end of the trip stops due to opening of the main circuit and automatic application of the brake.

Screening Plant

The bin into which the skips dump their loads has a capacity of about 300 tons of material. Hopper-shaped openings in the floor of this bin feed the raw material to heavily constructed pan feeders. The capacity of the feeders is regulated by a sliding shut-off gate in the hopper and by a series of adjustable swinging restraining hammers suspended above them. The feeders discharge over inclined stationary bar grizzlies having 3-in. free openings, the oversize at this point dropping down to the crusher feed bin below and the undersize, falling through the bars, is met by the first washing water, which carries it into the first bank of washing and sizing screens.

Sixteen cylindrical washing screens are provided, each 42 in. in diameter by 10 ft. long. The screens are mounted on the structural steel framework in four banks of four screens each, the perforations ranging from 1¾-in. in the first bank to ¼-in. in the lowest bank, all square holes. The oversize from the first bank of screens is rejected and spouted back to the crusher feed bin. The other screens are arranged to make and deliver to the loading bins below, three sizes of gravel for the Chicago market; "No. 9," "No. 8," and "Roofing." Fresh water is introduced at each bank of screens and all are provided with lifter angles to tumble the material, thus insuring a clean and well sized product.

Crushing Plant

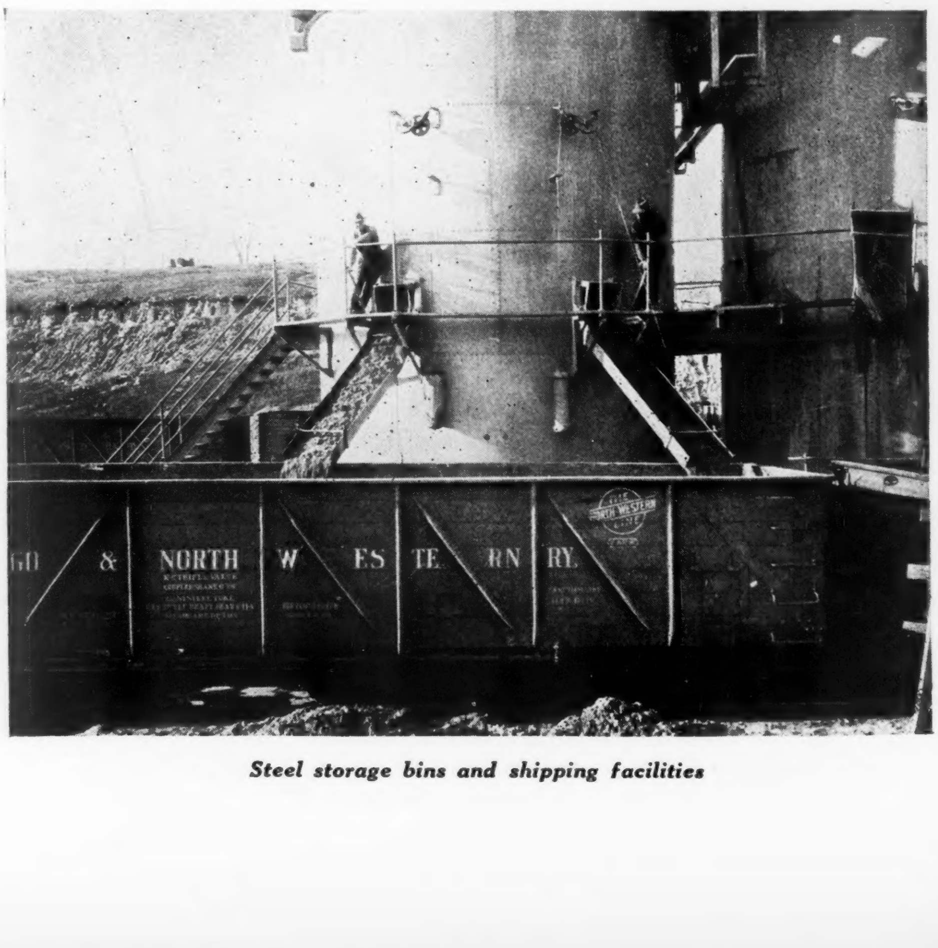
The oversize gravel rejected by the grizzleys and from the first bank of screens falls by gravity into a cylindrical steel crusher feed bin located in the main tower above and between the crushers. From this bin the material feeds through quadrant type, self-closing gates to three gyratory crushers, two No. 5's and one No. 6. These crushers are all mounted within the tower on a heavy concrete slab, which also forms the ceiling over the hoist room below. Room is provided within the same confines to install a second No. 6 crusher should it be required. A 100-h.p. motor drives the two No. 5's and a 75-h.p. motor drives the No. 6 machine. The product of these three crushers falls upon a 24-in. wide belt conveyor 32 ft. centers which returns the crushed material to the main hopper. This is the *only* belt conveyor in the entire plant.

Sand Recovery

The sand, coming from the last bank of screens, together with all the wash water, passes on to a battery of eight steel tipping sand boxes wherein the torpedo sand is removed and discharged into the loading bins below. The water and remaining fine sand flow on to a fine sand separating and dewatering device of special design.

This device consists of four inclined screws, driven by a 20-h.p. motor through a countershaft. The lower half of these screws run under water in a large settling chamber and, due to the great reduction in the rate of flow of the water, the fine sand settles down and is caught by the screws and dragged up and out of the box and discharged clean and practically dry into the loading tank. The water, carrying with it the clayey matter, silt and other foreign material in suspension, flows out of the settling basin over a shallow weir and into a spillway. This spillway leads out from the plant, across the lake to the low ground on the other side, where the water and dirt are discharged, the water eventually finding its way back to the lake.

The loading bins are five in number—one each for the No. 9 and No. 8 gravel, two for torpedo sand and the fifth for the mason's sand. The total live capacity of the



Steel storage bins and shipping facilities

five loading bins above the gate line is about 1700 tons. Each tank is provided with four quadrant type bin gates having hinged and counterbalanced steel spouts. These tanks are of steel plate construction mounted on concrete foundations and form the supports of the steel superstructure above which carries the screens, etc.

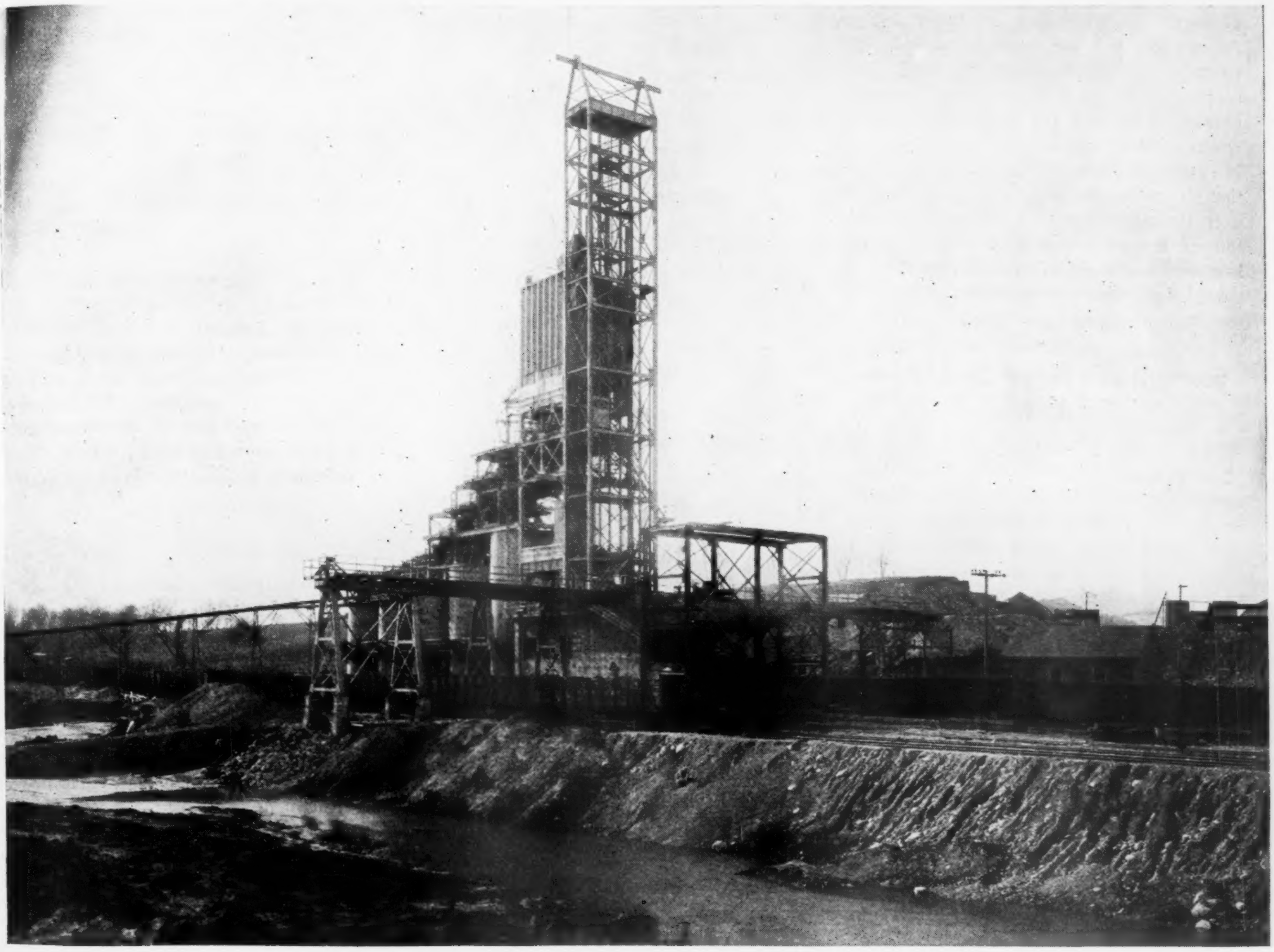
Two American Well Works centrifugal pumps direct connected to 60-h.p. motors furnish 2500 gal. of water per min. under a total head of 135 ft., for washing purposes. The pump house is located about 350 ft. from the plant at the edge of the artificial lake and the pump intake is protected by a concrete crib having heavy trash screens. Their discharge lines join in one asphalt coated spiral riveted pipe running underground to the side of the main tower and thence straight up to the feeder floor, from which point branch lines carry the water to the various washing nozzles.

Concrete and Steel Throughout

Foundations for building and machinery throughout, the track hopper and hoist room are of reinforced concrete and all structures above are of steel. Comfortably wide stairways give access to all parts of the plant below the skip-dumping bin and all platforms, walkways and stairs are provided with pipe or angle iron handrails. Steel ladders provided with circular steel guards give access to the top of skip bin and head sheaves. A full revolving, hand-operated jib crane of 3 tons capacity is mounted over the top bank of screens to facilitate removal and change of screen sections and the handling of repairs throughout the plant.

The crushers and hoist were furnished by the Allis-Chalmers Manufacturing Co. of Milwaukee; motors, except that for the hoist, by the General Electric Co.; the 10-yd. skips and the loading bins by the Philip J. Sharkey Boiler and Tank Works of Chicago; and the screens, feeders, silent chain drives, fine sand separators, pan elevator and skip counterbalance mechanism by H. W. Caldwell & Sons Co. of Chicago. The Continental Bridge Co. of Chicago and the Milwaukee Bridge Co. of Milwaukee furnished and erected all structural steel work and the concrete work was done by the Ratledge-Bone Construction Co. of Chicago.

The plant is electrically operated throughout using power furnished by the Public Service Co. of Northern Illinois. The high tension line (33000 volts) is brought into the property from the Northwestern's right of way, along the fill to a transformer substation located near the plant. At this point there are installed three 33,000/480 volt transformers. The low tension current is carried underground from this point to the room under the hoist operator's platform to a main oil switch and thence to a distribution cabinet, from which the various motor circuits lead. All wiring is run in rigid metal conduit and is in strict accordance with the Underwriters' specifications.



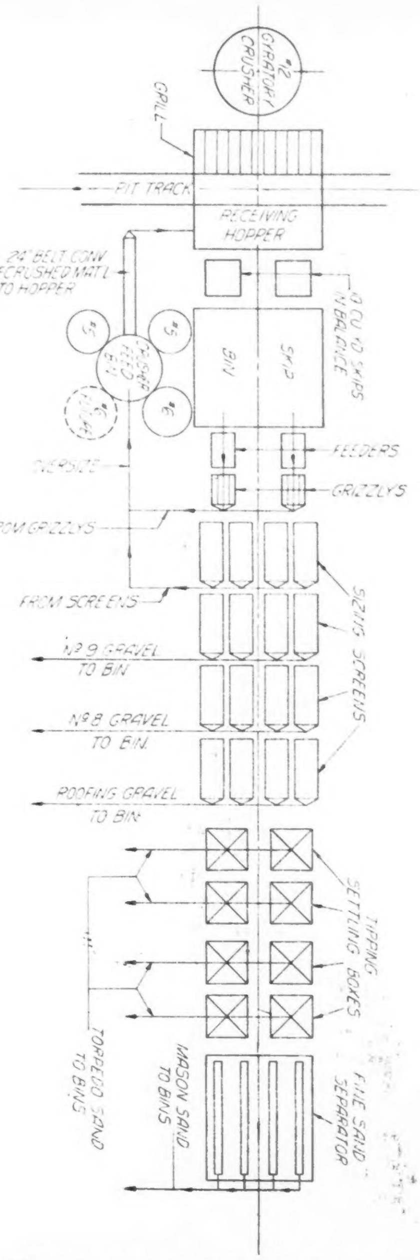
Another general view of the plant showing the skip hoist tower

Personnel

The owner of this plant, the Wisconsin Lime and Cement Co., with main offices at 111 West Washington St., Chicago, is one of the largest distributors of building materials and coal in the country. They operate eleven retail yards in and around the city and maintain a large fleet of motor trucks, rendering a high standard of service to all users of such products. It was with the idea of extending and elaborating an already justly famed service that they erected

this plant to provide their own source of concrete aggregates. The officers of the company are as follows: Joseph Hock, president; R. C. Brown, vice-president; Adolph Loeffler, treasurer; and Charles Woodward, secretary. Operations at Crystal Lake are in charge of Charles O. Trainor, superintendent. This plant was designed throughout by the J. C. Buckbee Co., engineers, of Chicago, and constructed under their supervision.

The plant has now been in operation for about six months and has already given ample evidence of its ability to greatly exceed expectations, both as to the quality of the product and the tonnage handled. For example, during the month of April, 1925, nearly 70,000 tons of material were produced, or about 1400 cars, and during the first two weeks of May the average production was in excess of 70 cars daily. Power consumption is unusually low, averaging slightly over three-quarters of a kilowatt-hour per ton of material shipped. An idea of the low over-all cost of production may be gained from the fact that only seven men are employed about the plant proper.



Flow sheet of Crystal Lake Sand and Gravel plant

Strength Tests on Sand-Lime Brick Walls

THE Bureau of Standards has published technologic paper No. 276, "Compressive Strength of Sand-Lime Brick Walls," by H. L. Whittemore and A. H. Stang. It is a full report of the tests conducted, giving a description of the specimens and test methods and results obtained. Eighteen walls, 6 ft. long and 9 ft. high, and 18 wallettes, about 18 in. long and 34 in. high of the same construction, were tested. Lime, cement-lime and cement mortars were used. The mortar mixtures were: Lime mortar, one 50-lb. bag of hydrated lime to 3 cu. ft. of damp sand; cement-lime mortar, one 94-lb. bag of portland cement, one 50-lb. bag of hydrated lime to 6 cu. ft. of damp sand; cement mortar, one 94-lb. bag of portland cement to 3 cu. ft. of damp sand. Half of the wall specimens were 8 in. and half 12½ in. thick. The sand-lime brick used was the grade of "medium brick," according to A. S. T. M. specification C 21-20. The walls were tested from 59 to 61 days after construction.

The conclusions deduced from the results of the compressive tests of the walls and wallettes were:

1. The cement-mortar walls were built as rapidly as lime-mortar walls and the thickness of the mortar joints was practically the same for all of the walls.

2. For an eight-hour day the rate of laying the brick varied from about 1200 to 1400, depending on the thickness of the wall.

3. The deformation of the walls under a compressive load was not proportional to the load, but would be represented by an equation of the type $S = Cd^n$ where S is stress, C is a constant, d is deformation and the exponent n is less than unity.

4. The stress at failure was greater for the 8-in. walls than for the 12½-in. walls.

5. The cement-lime mortar walls were 106% stronger and the cement-mortar walls 199% stronger than those built with lime-mortar.

6. Based on Masonry Wall Construction, 1923, of the Building Code Committee of the Department of Commerce, the factor of safety for the lime-mortar walls was 2.4, for the cement-lime mortar walls 3.1 and for the cement-mortar walls 3.6.

7. The ultimate compressive stress of the walls was from 60 to 80% of the ultimate stress of the wallettes.

Copies of this paper can be secured for 10 cents each from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Specification for Wire Rope

THE most important paper in its field that has been issued in several years is Circular 208 of the Bureau of Standards, United States Government Master Specification for Wire Rope, copies of which are now on sale at the office of the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents each.

The paper is made up of eight major sections dealing with types, material and workmanship, general requirements, detailed requirements, inspection and tests, packing and marking, additional information, and general specifications.

It contains 28 line drawings and halftones illustrating types of rope, methods of measuring rope diameter, application of seizing, clips, and other fastenings for wire rope. The properties of the different types of rope are set forth in tables which give all the important data in very compact form.

This circular has been prepared, after careful study, by the wire-rope committee of the Federal Specifications Board, the chairman of the committee being H. L. Whittemore, of this bureau; and was officially promulgated by the board on June 1, for the use of the departments and independent establishments of the Government in the purchase of wire rope.

Highway Research Board Studying Improvement of Earth Roads

ANNOUNCEMENT is made by Chas. M. Upham, director of the Highway Research Board of the National Research Council, that Prof. S. S. Steinberg of the University of Maryland has been designated acting secretary of the new investigation begun by that board on the development of earth roads. The object of this investigation, which will be national in scope, is to co-ordinate the efforts and data already available on the improvement of earth roads and to stimulate further research in order to find an inexpensive surface that will carry intermediate traffic at a low cost of both construction and maintenance.

Professor Steinberg has had 15 years of engineering experience about 10 years of which were spent in highway construction and highway research. Since 1918 he has been with the University of Maryland and for the past five years as head of the department and professor of civil engineering. He still retains this connection.

During several summers Professor Steinberg was in the U. S. Bureau of Public Roads on detail at the University of Maryland in connection with highway research. During the past summer he was assistant director of the Highway Research Board of the National Research Council.

Sand and Gravel Producers Working With Railways on Ballast Specifications

F. D. Coppock, President of the Greenville Gravel Company, Attends Ballast Committee Meeting of the American Railway Engineering Association at Pittsburgh

SOME TIME ago the American Railway Engineering Association appointed a general ballast committee for the purpose of making an investigation and report on a general gravel specification for railway ballast. At the same time, the National Sand and Gravel Association appointed a committee for the same purpose. These two committees have been working towards the accomplishment of their mutual aim for several months. Recently the A. R. E. A. committee had a meeting in Pittsburgh to which they invited F. D. Coppock, president of the Greenville Gravel Co., to be present as a representative of the gravel producers. Mr. Coppock has made a full, detailed report of the result of this general conference to the National Sand and Gravel Association. The following is a resume, or summary, of Mr. Coppock's report:

"F. J. Stimson, chairman of the A. R. E. A. committee, having charge of the Pittsburgh meeting, in his preliminary remarks stated that specifications governing the production of gravel ballast had been asked for the A. R. E. A. some time ago, and that there seemed to be a considerable variance of opinion as to what should constitute a practical specification; and, too, that the varying conditions of the natural deposits of gravel made it very difficult to arrive at a specification which could be applied in a general way. He stated that he realized it was going to be a difficult job, yet it was very important that a specification be determined upon, which could be used as a guide to the operator of the gravel plant as well as the railway officials. He stated that I had been invited for the purpose of discussing with them matters in connection with gravel plant operation and gravel deposits, which should be given consideration in determining a specification.

"During the discussion that followed I explained to the committee that in our opinion one specification governing the production of ballast gravel would not be practicable, except as it would govern certain general conditions.

No Two Deposits of Gravel Alike

"I explained to them that it was a hard matter to find two deposits of gravel alike except in an immediate territory, the natural deposits varying materially, especially as to coarseness, which would influence the kind of ballast produced. As the A. R. E. A. wants a specification that can be applied in all of the territories of the United States and Canada, consideration should be given to the varying conditions of the natural deposits. I cited as an example the 11 plants and deposits which we are operating, explaining to them that it would be impossible for us to produce, in a practicable way, the same kind of ballast at all of our plants.

"Some of our deposits contain large percentages of over-sized boulders which are crushed, rewashed and mixed uniformly with the pebbles. The crushed particles mixed in this kind of ballast tend to make it firm and prevent creeping or shifting and permit removing the sand and finer particles. Other of our deposits contain so little oversize that it is necessary to mix with the pebbles a small per cent of sand to prevent creeping or rolling.

F. D. Coppock, President, Greenville Gravel Co.

"The condition existing at our several plants is somewhat representative of the deposit conditions throughout the territory of the A. R. E. A. A specification which would produce the very best gravel ballast from one deposit and plant would not produce the best ballast from another. Therefore, it seems best to have at least three or four alternate specifications, each one a part of and subject to certain conditions of a general specification. These different specifications could then be used by the railway companies and the producers in the different territories as a guide to both, and in such a way as to produce from the particular deposit the best possible ballast at a reasonable cost.

Should Fix Maximum and Minimum Limits to Variables

"For example, the general specification could fix the maximum and minimum size and also state the limiting per cents of the various sizes of pebbles contained in the mixture. The general specification would limit the loam or foreign matter contained in the ballast, also limit the per cent of soft stone. It would exact a uniform mixture of the various sizes in the ballast as it is loaded into cars, and such other general conditions as would apply to all deposits and all operations.

"Then, in order to have something to use as a guide, in producing ballast from the coarser deposits as well as from the finer deposits, and at the same time be able to apply a specification to the particular deposit which would produce the best uniform ballast from that deposit, it seems that there should be under the general specification some division or classification which would indicate this difference.

"For instance, Class A under the general specification could define a ballast consisting of 30% crushed, rewashed boulders, uniformly mixed with the pebbles, and limit the minimum size of pebbles to 1/8 in. Class B could define a ballast containing 15% crushed and limiting the size of the smallest particles to 1/10th in. Class C could define a ballast consisting of no crushed material and containing possibly 10% of sand under 1/10th in.

Specifications Must Fit Nature of Deposit

"The production of gravel ballast is not like producing an all crushed-stone ballast, as the crushing of rock from the solid mass results in a more uniform product, the rejections or percentage of byproducts from stone ballast being practically the same in all instances. This makes it possible to pro-

duce stone under a single uniform specification.

"The production of gravel ballast is different. Nature's process of crushing and piling up the stone fragments in the deposits as we find them resulted in a very irregular mixture of sizes, ranging from deposits of all sand to deposits of all boulders, a large number of the deposits containing 50% of fine sand and little or no over-size stone to crush.

"A specification which would not permit the mixing of the crushed boulders with the pebbles would be impracticable, considering certain operations; likewise a specification requiring a certain percentage of crushed material would eliminate the use of certain deposits. In either case it would increase the cost of production so as to make the prices prohibitive.

"The cost of production is of importance to both the railway company and the producer. The railway company may prefer a certain kind of gravel ballast, and yet would not be warranted in exacting a certain specification which would materially increase the costs and exempt a large number of deposits.

"In order to give the ballast committee a more general idea as to the varying conditions of the gravel deposits we made screen tests of the average gravel in our different deposits, showing the percentage of over-size, the percentage of sand and the percentage of the various sizes of pebbles making up the gravel. Our idea was that such figures would not only show that the deposits varied materially as to coarseness, but that the figures could also be used in determining the limiting percentages of the various sizes of pebbles in the mixture of ballast.

Ballast Production Should Fit Economical Operation

"If the ballast committee is going to specify the amount of ¼-in., ½-in. and ¾-in. pebbles, etc., the percentages which will limit the amount of each size should be such as to conform favorably with the percentages as found in the average deposits of good gravel and not such as to cause a surplus or wasting of a lot of the material in the sizes above the sand.

"A specification somewhat regulating the percentages of the various sizes is of importance and should be very much to the advantage of the railway company and the producer. There should be uniformity to gravel ballast. The railway company should not be expected to take ballast from that part of a deposit which has no pebbles in it larger than ½-in., nor from a place in the pit where the gravel is all of one particular sized pebbles. Neither should the operator be allowed to take away from the ballast a certain size for which he may have a market, if in doing so he interferes with the quality or uniformity of the ballast.

"The lack of a specification has encouraged some of the producers of gravel ballast to use their ballast, loading more or less as a kind of dumping place for the sizes which they could not sell to the commercial trade. This is not fair to the railway company, neither is it to the best interests of the producers. The present low prices on gravel ballast and the lack of interest in gravel ballast on the part of some railway officials is due entirely to the indifference and poor service of the gravel producer. I can see no reason why the railway ballast business should not be made as attractive to the gravel producers and as profitable as any other part of his business. Gravel makes an excellent ballast if properly prepared and will always be used in certain localities.

"The kind of ballast to be used is somewhat geographically determined. Certain districts have but little and very poor gravel and yet have an abundance of good rock. Such conditions warrant the use of crushed-rock ballast. The districts, however, which are supplied with natural deposits of good gravel can be served with a washed, screened and crushed gravel ballast at a low first cost and with a low cost of maintenance.

"Considering the cost of producing crushed-rock ballast and the prices being paid for ballast, the railway companies can afford to pay more for a properly prepared gravel ballast than is being paid. But the railway companies should not be asked to pay more for the indifferent service and poorly prepared ballast which is being furnished by certain producers today.

Rock Ballast Being Resurfaced with Gravel

"It was very interesting to note during the discussions the varying opinions as to the merits of gravel ballast. Some were frankly in favor of its use, preferring the washed screened gravel ballast to that of crushed rock, especially those who had had experience with gravel ballast from plants where the material is being properly prepared and the producers are trying to give good service. Some engineers advocate the use of a washed screened gravel ballast on top of crushed rock, their claim being that the rock forms a more substantial supporting base and the gravel a better maintenance material. Some of the railways are now placing gravel ballast on top of their stone ballast instead of going to the expense of cleaning the fouled stone which is under their tracks, or renewing with broken stone. Most of the objection to gravel ballast is due to the experience had with dirty, sandy or bouldery bank-run gravel, or poorly prepared gravel ballast from the gravel plants.

Produces 1,500,000 Tons of Ballast Per Year

"I seem to have wandered somewhat from the main subject, which I am apt to do, realizing the vital importance to our own business of a definite gravel ballast specification. Our own shipments of ballast alone during 1924 amounted to 31,000 cars, and 1925 promises to be a bigger year. I feel that the ballast committee of the National Sand and Gravel Association has a very important duty to perform, insofar as they are able to assist the ballast committee of the A. R. E. A. ballast committee to co-operate with us in determining a practical specification should be very much appreciated, not only by our committee but every member of the association.

"After considerable discussion by the A. R. E. A. ballast committee, Mr. Stimson, chairman, instructed the sub-committee on railway ballast to prepare a specification governing the production of washed screened gravel ballast and to present this report at some future meeting of the general committee for approval. This committee consists of C. E. Dare, engineer of maintenance-of-way, Richmond, Fredericksburg and Potomac Ry., Alexandria, Va., chairman; J. G. Bloom, engineer of maintenance-of-way, Chicago, Rock Island and Pacific Ry., Chicago, Ill.; H. N. Huntsman, division engineer, Wabash Ry., Moberly, Mo.; G. F. MacLaren, engineer of maintenance-of-way, Canadian National Ry., Toronto, Ont., and A. H. Woerner, division engineer, Baltimore and Ohio R. R., Washington, Ind.

"I have suggested to the ballast committee of the National Sand and Gravel Association that we would appreciate the privilege of being permitted to send a representative to meet with them for the purpose of a further discussion as to a practical specification and one which would produce the best results, considering the railway company as well as the producer. I told them that personally, I would be very glad to meet with them at any time and any place most convenient to them."

Safety Expert Declares Machine Guards Speed Up Production

MACHINE GUARDS actually speed up production, says a statement issued by John Sandel of the National Safety Council's industrial division, who takes exception to allegations to the contrary. Mr. Sandel, who as a safety engineer is in close touch with numerous industries, does not place any credence in the arguments of some shop managers that production is lowered by the installation of safeguards.

"The use of safeguards for machinery is one of the most important steps in accident prevention work. Men naturally work faster when they do not have to worry about the dangers of being injured. A man who uses a safety razor can shave faster than a man who employs an old fashioned instrument. Progressive employers are purchasing machinery and equipment that have the necessary guards because they realize that, while the initial cost is higher, these devices reduce accidents and result in greater production."

Modern Methods of Mining and Refining Gypsum and Gypsum Products*

Article VII—Gypsite; Its Occurrence, Recovery and Treatment

By Alva Warren Tyler

GYPSITE, as explained in a previous article, is a soft "gypsum earth" quite distinct in character from "gypsum sands" found in some sections of the country, particularly in New Mexico, and which are formed from the erosion of gypsum rock.

The formation of gypsite is generally believed to have originated in its deposit from solution which became impregnated from waters percolating up through beds of the mother rock lying below the earth's surface. It is usually mixed with clay, especially near the bottom of the deposit, also organic matter and other impurities, these impurities giving it a color which runs from a light cream to gray.

In some cases a pinkish or brownish color is in evidence. Due to this characteristic "off color" the plaster manufactured from gypsite is often spoken of as "dark plaster"; however, in spite of its impurities and color gypsite produces a very smooth, rich working plaster, which is consequently very popular with the trade in sections where these qualities have become recognized.

In a wet or damp condition gypsite is very sticky, a handful being easily moulded into a hard ball, much the same as clay may be moulded, while when dry it breaks up into practically an impalpable powder. This may be demonstrated by rubbing a small sample in the palm of the hand.

The production of gypsite plasters in the United States has been confined chiefly to the states of Oklahoma and Texas. This is probably due to both the fact that these deposits are of particularly high grade, and to their being favorably located for supplying the demand of the large population of the surrounding territory. There are other large gypsite deposits in the far western states, particularly in California, but these have remained undeveloped due either to their undesirable location or to the fact that they carry impurities detrimental to the production of good plaster. Some of these deposits, otherwise very high grade are useless, for the present at least, on account of the high content of common salt.

It might be imagined by those unfamiliar with these deposits that the salt might be quite easily removed by washing but when it is known that they occur in the open

Figs. 1. Horse and scraper outfit once very generally used for mining gypsite in the Southwest

Small gasoline tractors have replaced horses at nearly all the larger operations in the Southwest

Figs. 2. Caterpillar tractor with train of wheeled scrapers do mining now

Another view of tractor and train of wheeled scrapers

Bridge from which scrapers are dumped into cars to plant

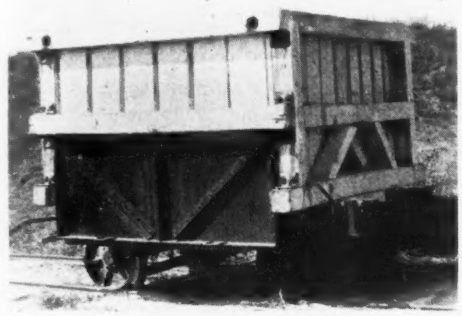
desert where the only available water supply is that shipped in by train the impracticability of the idea becomes apparent. It is quite reasonable to suppose, however, that some future water development may make available such deposits which are now of no value.

Gypsite deposits near Okarche and Eldorado, Oklahoma, and near Acme, Texas, have been worked on a comparatively large scale for years. Some of these have been exhausted. Within the past year new mills have been built and put in operation on newly opened deposits near Rotan, Texas, and Sweetwater, Texas; See Figs. 7 and 2. Figs. 3, 4, 5 and 6 illustrate large test holes in the Rotan deposit, a number of which were dug at various points for the purpose of determining the depth and quality. Of course these characteristics may be determined by means of a long test augur but could not be illustrated. It will be seen that, in this deposit there is very little overburden, the gypsite running nearly to the surface of the ground. A systematic drilling of this deposit showed a depth of gypsite running from 6 to 15 ft. and practically continuous throughout the area, instead of being broken up in "pockets" as is the case in many such deposits. The illustrations also indicate the level character of the land in this section.

Mining Gypsite

The mining or reclaiming of gypsite is a comparatively simple process, the earlier developments having been carried on by the use of plows and scrapers drawn by either horses or mules. The overburden was first removed by plowing to loosen the dirt, then scraping until a sufficient area of gypsite was uncovered as to be able to properly proceed with its recovery. The gypsite was also plowed both for the purpose of making it readily handled by the scrapers and for the further purpose of exposing it to the air, so that it might dry out as much as possible before delivering to the mill. The loosened gypsite was then delivered by the scrapers to small dump cars usually operated on steel rails running to the mill. This operation, that of loading the cars, was facilitated by the use of "traps" which were merely small bridges or "miniature viaducts" built up over the tracks on which were run the cars to be loaded.. Empty cars were placed under the bridge in the center of which were built hoppers delivering to the cars. The loaded scrapers approached from one side of the bridge, dumped their charge into the hopper and descended from the bridge on the opposite side. By having a sufficient number of teams and scrapers, practically a continuous loading operation could be maintained in this way.

The demand for increased production, and the advent of the gasoline tractor, led to the substitution of tractors for teams and wheeled scrapers of larger capacities for the slip scrapers, heavier "traps" being built for their accommodation. From one to three wheeled scrapers were operated in



Type of car used at one big Oklahoma operation

series, depending on the size of tractor adopted (See Figs. 7 and 8). Eventually experience demonstrated that the fast small tractor with very little expense for upkeep was preferable to the larger more cumbersome machine running high in operating costs, although the latter was capable of handling much greater loads per trip. This system is still in use, and where the deposit runs in pockets, as is frequently the case, it is probable that it is practically as economical or perhaps more so, than the more modern methods, the power dragline or power shovel.

Where the gypsite beds have a good depth and are reasonably continuous, and particularly when large production is required, the power shovel or dragline is the logical method of reclaiming the material. Each method has its advantages; the shovel, of course, works to best advantage when operating on a deep bed where its full stroke and capacity may be utilized. No plowing or loosening of the material is necessary. Also a very marked advantage lies in the fact that with each stroke of the shovel an average quality of material is obtained since it sweeps unwardly from the bottom to the top of the deposit. As there is considerable variation in the quality of these deposits between the top and bottom layers the value of this mixing action is apparent.

With the shovel, however, auxiliary equipment must be maintained for stripping; in shallow beds its efficiency is largely lost; its principle of operation necessitates its working from a plane approximately in line with the bottom of the beds—also the loading track is in approximately this same plane. This means that unless the deposit is well protected from danger of flooding there may be the necessity of pumping out the workings after a heavy rain, before operations may again be resumed. Besides this, there is the objection of having to haul the loads up grade to the mill—unless, again the contour of the ground is such as to be in favor of these conditions, which, of course, would be an exception.

With a dragline, however, the operation is carried on from the top of the deposit where is also located the loading track. Both of the last objections to the shovel are thus overcome. The dragline is capable of doing its own stripping thus eliminating auxiliary equipment. And while this machine is, perhaps, not as efficient as the shovel in mixing the material as it is taken from the bed it is very nearly so. It has the further advan-

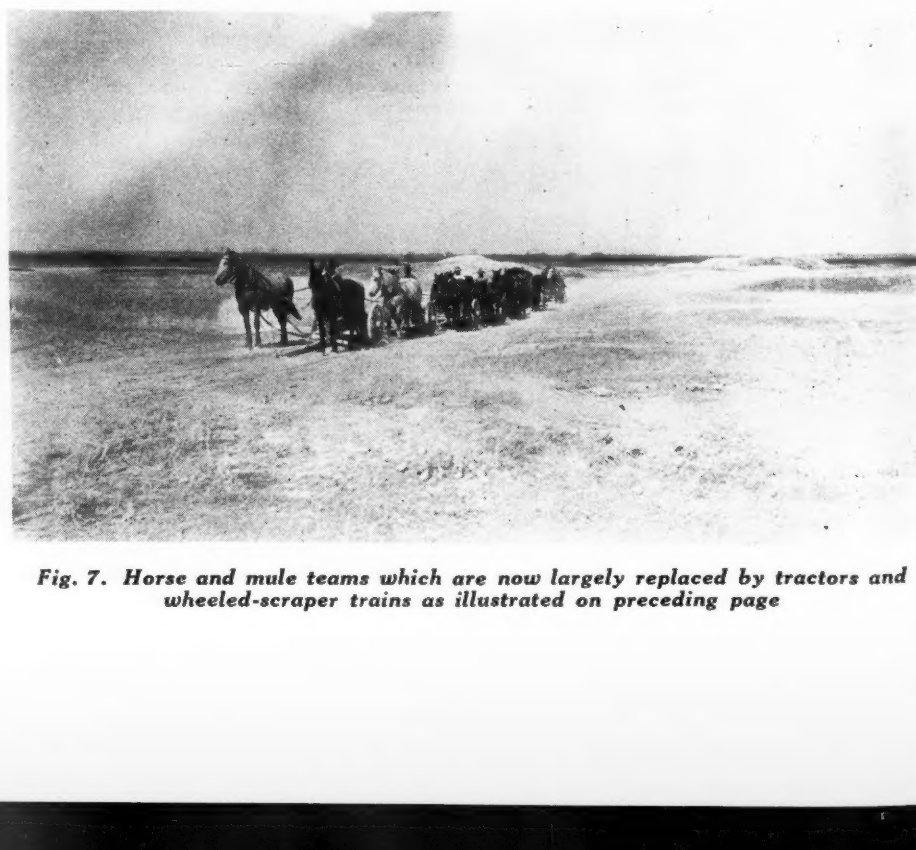


Fig. 7. Horse and mule teams which are now largely replaced by tractors and wheeled-scraper trains as illustrated on preceding page

Fig. 3. An Oklahoma gypsite deposit practically with no overburden

Fig. 4. Part of same deposits with only 6 in. of overburden

tage of being able to deposit the strippings back into the exhausted part of the workings where they are entirely out of the way.

There is the one advantage the shovel may have over the dragline, that is its positive digging action against a particularly stubborn deposit. It is barely possible that in extreme cases the shovel would handle such deposits to a better advantage than the dragline. In the case of either machine no "traps" are necessary, and one operator is ordinarily all that is required.

Hauling

In the earlier operations, hauling gypsite, like the plowing and scraping, was accomplished by horses and mules, hitched to home-made cars. Today, however, dump cars carrying from 10 to 15 tons each are hauled by small gasoline locomotives, and unless the length of haul is unusually long one such

Fig. 5. Test pit in Rotan, Texas, gypsite deposit

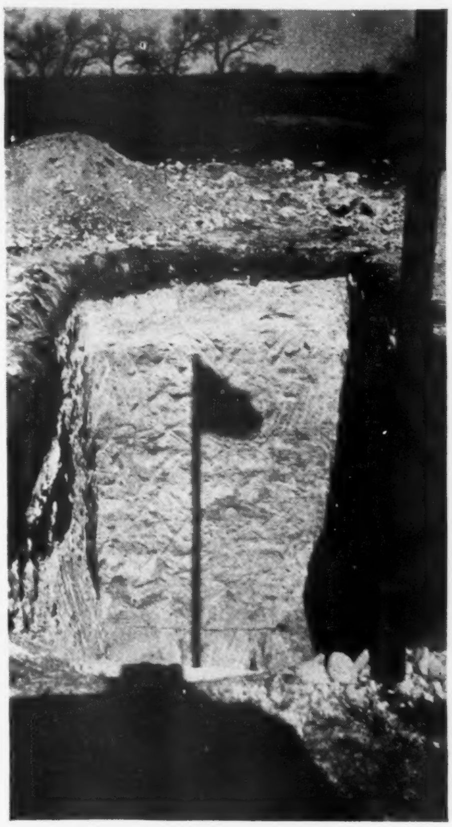


Fig. 6. Test pit illustrating the depth of deposit at Rotan

locomotive will take care of the requirements of any modern gypsite plant.

(Next article will treat of the calcination of gypsite.)

House Built of Gypsum "Insulex"

A SEVEN-ROOM house with 100 thermometers and only three doors, built on the principle of the thermos bottle, has been designed by Architect C. W. Lampe and is being constructed under his direction for A. H. Ashenhurst, inventor of "Insulex," a patented porous gypsum plaster or concrete—at the southwest corner of Tahoma and Algonquin avenues, Edgebrook Manor, Chicago.

The house will be a one-story frame building with stained shingle exterior, 39 by 28½ ft. and will contain five rooms and a bath downstairs and two rooms upstairs. Yes, there will be two rooms upstairs even though it is a one-story house.

Inside the walls from the ground line to the eaves and under the entire roof will be a 4-in. coating of "Insulex." This plaster contains certain chemicals so that when it is mixed with water it expands to many times its original bulk before it sets. After hardening the plaster is honeycombed with millions of dead air cells produced by the expansion process. These cells operate much like the vacuum cells of the vacuum bottles in excluding heat or cold.

With all walls heavily insulated Mr. Ashenhurst will be able to heat his house with the smallest hot-water plant that can be obtained, Mr. Lampe asserts, and by raising the roof in the form of a long dormer window at the rear the entire attic may be used for sleeping rooms. The four inches of insulation under the roof will keep this space cool even in hot weather.

Mr. Ashenhurst has made extensive studies of the variations in temperature in different parts of houses due to loss of heat or to excessive heat from the sun and may be expected to follow out this study by placing thermometers in every available spot in his new home.

The interior will be notable for the absence of doors and woodwork. Arched passageways connect all rooms and only the passageways to the bedrooms and bath will have doors. The only trim will be a narrow baseboard and a picture rail.

A recent broadside issued by the Universal Gypsum Co., Chicago, states:

"Insulex is protected by broad patents, not only as a cellular gypsum structure but also as a dry mixture which, upon the addition of water, creates the cells that form the cellular gypsum structure. Many applications for patents are pending covering "Insulex" in combination with various building materials including methods of installation or use of "Insulex." In these patent applications numerous additional patent claims have already been allowed.

The aforesaid patents and applications for patents on "Insulex" are now owned by a subsidiary of this company.

"Insulex" is a scientifically compounded material. Its commercial perfection was reached only through years of research and careful observation of the hundreds of actual installations that have been made for various purposes in all types of buildings and in all kinds of weather."

Engineers Are Expecting Better Cement and Better Concrete

Papers and Discussions at Annual Meeting of American Society for Testing Materials Show Trend for Higher Quality Rock Products—Cement, Lime, Gypsum and Aggregates

THE regular annual meeting of the American Society for Testing Materials was held at Atlantic City, June 22 to June 26, and one who was present has hazarded the opinion that it was perhaps as important for cement and some other rock products as any that has been held since the A. S. T. M. specifications for portland cement were adopted. For the report of Committee C-1 included a manual for cement testing which is a much needed addition to those specifications. It is very complete; it would make about eight full pages of ROCK PRODUCTS and this is evidence of the care and thought that has gone into its preparation by the members of the committee. The use of the methods described in the manual is not mandatory but it is to be sent out hereafter with every copy of the specifications. It was needed because it is now a matter of common knowledge that laboratories of reputable standing often do not agree in results of testing the same sample. Reasons for this are to be found in manipulation control of temperature and moisture during the setting and hardening periods and other matters which are treated in the manual, and it is thought that the use of standard methods will go far toward securing concordance in the results of testing.

The committee's report was expected and caused no particular excitement. But the paper read by A. T. Goldbeck, chief of tests of the Bureau of Public Roads, did cause considerable discussion and it was of such a nature that it appeared that his paper had touched upon matters in which highway engineers and others are vitally interested. The "meat" of Mr. Goldbeck's paper is to be found in his concluding paragraphs, which are as follows:

Concrete Roads Require High-Grade Cement

"As a whole very satisfactory concrete roads have been built with cement passing our present standard requirements. As a rule, however, most brands of cement fall well within our minimum test limits and some doubt has been expressed whether low testing cement is really satisfactory for concrete pavements because of the high early stresses to which pavements are subjected. It would seem that technically high early testing cement should lead to still better construction. Economically this has yet to be demonstrated. If high early strength can be attained with no decided increase in cost and no danger of disintegration, surely it is justified and desirable and is something which cement manufacturers should look forward to. It is felt that in many cases where cement is testing low, the mill practice is at fault and much better results would be possible if such mills would exercise more meticulous control over their product. There is no question in my mind that the general standard of quality of portland cement can be raised merely through careful manufacture on the part of all of the mills instead of in some of them.

"To manufacturers I would say there is a growing feeling that a higher quality of cement is desired and that some manufacturers at least can and should improve their product for highway construction.

"To highway engineers my message would be that they are justified in their attempt to obtain concrete of higher tensile or cross-bending strength, but the means adopted, whether better cement, more cement, or better concrete control, should be based on established facts and it should be remembered that economic as well as technical questions are involved."

New Jersey Writes Own Specifications

Among the discussions both written and oral which followed probably none was received with greater interest than the written discussion of J. G. Bragg, senior testing engineer of the New Jersey Highway Commission. This was because New Jersey had, as Mr. Bragg put it, "kicked over the traces with respect to portland cement specifications," by which he meant that the strength requirements had been raised above those of the standard specification, Mr. Bragg gave the reasons for doing this. It was *not* that the cement supplied by the majority of the manufacturers with whom New Jersey deals was unsatisfactory. But cement from a small minority of manufacturers was unsatisfactory because it was not uniform, "the quality ranging from bad through various stages of poor and indifferent to good." It was noticed that these un-uniform cements tested lower than the stable brands and it was in the interest of promoting uniformity rather than added strength that the strength requirements were raised. For uniformity, as Mr. Bragg showed, is what every highway engineer is trying his best to secure in concrete pavements.

H. S. Clemmer of the Illinois Highway Commission took a somewhat different view from that of Mr. Bragg and pointed out that there were other variables besides the quality of the cement used that affected our concrete pavements. He said in part:

"It cannot be doubted that great improvements are possible in the quality of portland cement. At the same time it is well known that we have not become overly proficient in controlling the quality of concrete. Many variables having as important a bearing on the strength and life of concrete as the variation in the quality of the cement used are known to us, and include all those Mr. Goldbeck has tabulated. When we know that all these variables can be successfully regulated and our concrete lacks no other refinement or improvement than the use of better cement, then we can well worry about what the mills are shipping to our jobs."

There were other discussions, but these two have been taken as typifying the attitudes of highway engineers on a matter which is becoming daily of more interest. Mr. Clemmer made one suggestion in his paper that seems important and that is the need for some accelerated chemical or physical test which would reveal the rate of hardening in a short time.

Specifications for Lime

Committee C-7, on lime, offered a number of tentative suggestions for revision of the present accepted specifications. The first of these refers to the method of testing hydrated lime for structural purposes and principally to the method of controlling the consistency of the lime putty used in the test. The specifications for quicklime used in cooking sulphite pulp are recommended to be changed by deleting a number of sentences. The sub-committee on methods of tests has made some changes in the tentative methods previously employed, but the sub-committee on lime for highways could only report that the experimental work had not reached a state where a formal report could be presented.

It will interest aggregate producers to know that data are being collected by Committee C-7 from which to prepare specifications for sand for lime plastering.

The committee on gypsum, C-11, presented a most important report since it includes a number of revisions and tentative specifications for gypsum and gypsum products. The tentative specification for gypsum (C-22-24T) was recommended to be advanced to standard. No changes in the specification for calcined gypsum or gypsum plaster were offered. A tentative standard for sand for gypsum plastering was offered as well as tentative standards for wall board, plaster board and partition and flooring tile. Sub-Committee IV reported that it had prepared methods for determining the compressive and transverse strength of gypsum partition tile and block and other products and also the absorption. These methods are given fully in the report.

Several paragraphs of this report are given to tentative definitions of terms relative to the gypsum industry which are to be submitted to the committee of the society on definitions for approval and publication.

An important paper on the fire resistance of gypsum partitions was presented by S. H. Inberg, of the U. S. Bureau of Standards.

Concrete Aggregates and Concrete

Much of the work of the concrete meeting, while interesting and important to the designers of concrete structures and to workers in concrete, does not properly belong in Rock Products, so a report will be omitted here. An example of such a paper that one would like to abstract is that of Prof. D. A. Abrams on the bond between steel and concrete. Another by H. F. Gonnerman had to do with the effect of the shape of concrete test specimens on the results of strength tests. The paper by F. H. Jackson and George Werner on a substitute for the slump test is also in this class. But there was a paper by John W. Gowen and H. Walter Leavitt which would be of interest to aggregate producers since it has to do with the testing of sand in mortars.

The paper is mainly given to mathematical analysis of tests by the "correlation method." It is the authors' opinion that both compressive and tensile strength tests are necessary since each gives some information regarding the qualities of the sand for mortar making that the other cannot give.

Abrasion Test for Mortar

The authors have developed a wear abrasion test for mortars which will be important to producers of highway materials. In brief this test consists in casting spheres of a mortar containing the sand to be tested and curing them for 28 days in moist air and water. They are then tested in the Deval abrasion cylinder just as specimens of stone would be tested. The method shows that resistance to wear is a true attribute of the mortar.

C. E. Proudly, in discussing this paper, gave some experiences in mortar testing by the Bureau of Public Roads, of which he is assistant testing engineer. Mr. Proudly spoke of the present unsatisfactory relation between mortar tests of any kind and the actual value of the sand in making concrete. He pointed out that certain sands had been rejected in mortar tests, whereas tests on concrete made with the same sands showed them to be quite satisfactory for the purpose. He thought it might be possible that we would not arrive at a satisfactory sand test until we used the sand in making fairly large specimens of concrete and subjected them to the usual concrete tests. But until that was done he thought that we should keep on with the strength test, using its results in conjunction with the other tests that show the value of the sand in making concrete.

Another paper on mortars, by E. E. Butterfield, gave methods of analysis for set and hardened mortars.

The session on road and paving materials for other than concrete pavements was largely given to methods of testing the stability of bituminous paving mixtures. Three papers each gave a method of doing this, the procedure and apparatus varying but the effect being shown by the deformation of the specimen or the extrusion of a part of it. In the discussion it was brought out that perhaps a more needed test would be one which would not concern itself so much with static loads, which were comparable to a vehicle standing at the curb, as with the vibrating load given by a moving vehicle.

Government Specification for Gypsum Wall Board

THE following U. S. Government Master Specification No. 284 has just been issued by the Bureau of Standards:

I. Types

This specification covers two types of gypsum wall board: A. Boards with square edges, designed for butted joints. B. Boards with rounded edges, designed for filled joints.

II. Material and Workmanship

Gypsum wall board consists of set gypsum plaster, with or without fiber, reinforced on the surfaces with sheets of fibrous material.

Gypsum wall boards are ⅜ in. thick.

Type A boards are 4 ft. wide; type B boards are 3 ft. 11¾ in. wide.

Gypsum wall boards may be had in any length from 4 to 12 ft., as specified by the purchaser.

That surface of the gypsum wall board designed to be exposed on erection shall be true and free from imperfections that would render the wall boards unfit for use, with or without decorations. The edges and ends shall be straight and solid. Boards of type A shall have corners square and opposite edges parallel. For boards of type B, a negative variation of ⅛ in. from parallelism of opposite edges is permissible.

III. General Requirements

1. *Dimension Tolerances.* (a) Thickness —A tolerance of $\pm 1/32$ in. is permissible.

(b) Width. A tolerance of —3/32 in. is permissible.

(c) Length. A tolerance of ±⅜ in. is permissible.

2. *Weight.* Gypsum wall board shall weigh not less than 1500 lb. nor more than 2000 lb. per 1000 sq. ft.

3. *Strength.* When the load is applied through a knife-edge parallel to the fibers in the surfacing material, gypsum wall board shall withstand a pressure of at least 32 lb.; when the knife-edge is at right angles to the fibers, the breaking load shall be at least 60 lb.

4. *Bond.* With loads equal to or less than those specified in Section III, 3, there shall be no breaking of the bond between the fibrous surfacing material and the plaster core.

IV. Detail Requirements

No details specified.

V. Method of Inspection and Test

1. *Sampling.* One per cent of the number of boards in a shipment, but not less than 10 boards, shall be so selected as to be representative of the shipment. Twenty-five per cent of such selected boards, but not less than 10 boards, shall constitute a sample. A strip 2 ft. long by the width of the board shall be cut from one end of the 10 or more boards in the sample and forwarded to the laboratory for test.

2. *Strength Test.* Two specimens, each 12x18 in., shall be cut from each board in the sample, one having the 18-in. dimension parallel to the fibers in the surfacing material, and the other at right angles to them. Each specimen is placed on two parallel knife-edges 16 in. apart and loaded at mid-span through a third knife-edge parallel to the other two. The breaking load is noted, and the bond, as defined under Section III, 4, is observed. The average strength of the 10 specimens cut from the boards in each direction is computed and compared with the respective requirements in Section III, 3.

VI. Packing and Marking

Gypsum wall board shall be packed in such a way as to be kept reasonably dry.

Gypsum wall board shall be stamped on each board with the name of the manufacturer and the brand, if any.

Gypsum wall boards ¼ in. or ½ in. thick may be had for special purposes.

H. Foster Bain Is New Secretary of A. I. M. M. E.

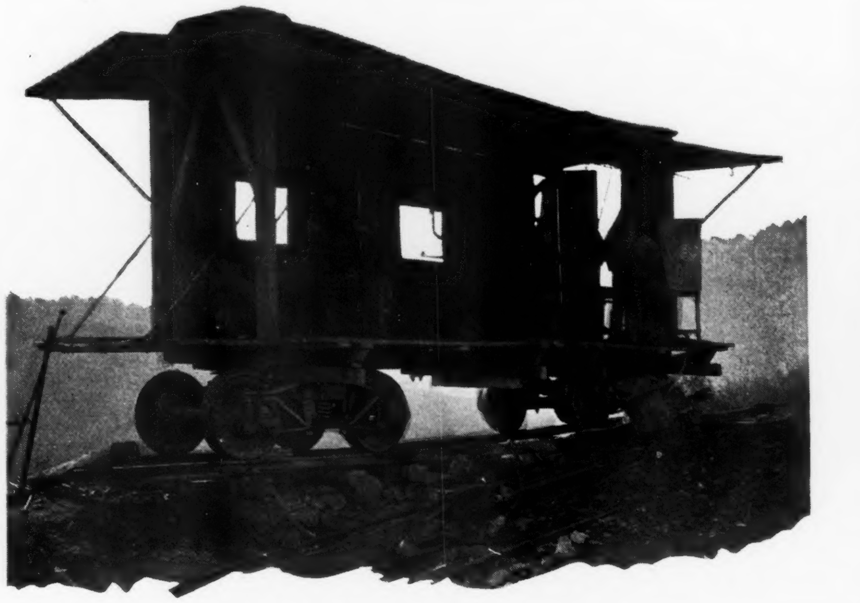
IT is announced that H. Foster Bain, who has been director of the United States Bureau of Mines for the past four years, has resigned to become secretary of the American Institute of Mining and Metallurgical Engineers. F. F. Sharpless, whom Mr. Bain succeeds, is to continue to devote a large part of his time as an associate.

Hints and Helps for Superintendents

Portable Blacksmith Shop

THE Virginia Limestone Corp., Klotz, Va., has developed and is using a portable blacksmith shop to take care of drill steels used in the quarry. In other words, instead of bringing the drill points to the shop, the shop is taken to the quarry, where the drills are. The quarry is a sidehill operation, with a river below, permitting hydraulic stripping. It is worked in benches, according to the *Compressed Air Magazine*, from which the data herewith are taken:

After stripping is completed, drilling is started about 12 ft. back from the face and carried to the stratum below. The drill holes are from 3½ to 4½ ft. apart—their depth depending upon the thickness of the bed of rock. As a matter of fact, with the exception of the 30 ft. stratum, which is drilled to a depth of 27 ft., the holes are usually carried down to the underlying stratum of rock. As the strata are well defined—in some cases having a few inches of clay or loam between them, the shots break the rock clean the full depth of 30 ft. The bench is not uniform in length because drilling across the quarry face is carried to a point from which the rock will break to best advantage. For bench drilling, the Ingersoll-Rand DDR-13 "Jackhamers" are used exclusively—a 2¾-in. starter, with 3-ft. changes of steels each of which has a variation of 1/16 in., being utilized for the 27-ft. holes. After shooting the bench, the larger pieces of rock are broken up by block-holing the BCR-430 "Jackhamers."



Portable blacksmith shop for a quarry

All the steels in service are kept fit for their work by a No. 4 "Leyner" sharpener—the blacksmith shop being mounted on wheels, of the same gage as the railway, so that it can be shifted readily as close to the point of drilling as may be desirable. Operating air for the drills and for the other pneumatic equipment used about the quarry is furnished by an Ingersoll-Rand Class "PRE" compressor. Air is fed to the "Jackhamers" through a 4-in. line carried over the crest of the rock face, which measures 212 ft. from top to bottom at its highest point. This main air line is, of course, far enough back from the face to permit quarrying to go on without the need of frequently shifting the piping. Drop lines, 1½ in. in diameter, are connected to the main line. Each drop line leads to a suitable manifold at the point of operations and serves two drills.

Portable electric-welding outfit for a sand and gravel plant

Portable Electric Welding Outfit

ELECTRIC welding demands the use of a special generator to furnish the low tension current that welding demands. Consequently it is more often used in shops and other places where the work is stationary.

The Massapanax Sand and Gravel Corp. of Fredericksburg, Va., has an electrical welding outfit which it has arranged so that it can be employed at any place on the operation. The generator is mounted in a box car. At the other end of the car is a gasoline engine which can run the generator when this is desired.

Ordinarily, however, the generator is run from a pulley on a shaft that extends from the machine shop belonging to the plant. The car at this time stands on a track close to the end of the shop and the leads for welding are run in through the rear wall.

When it is desired to do the welding away from the shop—at one of the two draglines

operated by the company, for example—the car is hooked on to the locomotive and pulled to where the work is to be done. Then the gas engine is started and belted to the generator.

The gas engine shaft is at right angles to the shaft with the pulley which runs the generator at the machine shop. In order that the generator may accommodate itself to both drives, it has been placed on a turntable. When it is to be changed from one drive to the other, a couple of bolts are taken out and the generator given a quarter turn. The bolts are placed in another set of holes in the turntable, and this assures that the shaft of the generator is in line with that of the gas engine and saves "lining up."

Concrete Stave Silos for Rock Products Plants

THE silo type of bin for crushed stone and sand and gravel plants is increasingly popular. Silos are made of steel, reinforced concrete and even of wood staves, as was described in an article recently published in Rock Products. Now comes the concrete stave silo, which would seem to have certain advantages over silos of other materials. It is more easily erected than some of the others, it is resistant to the wear of the descending stone and it is not seriously affected by water and in a locality where concrete silo staves are regularly made it is less expensive than some other materials.

The cut shows concrete stave silos which have been erected at the plant of the Jahncke Service, Inc., at Roselands, La. The Jahncke Service, Inc., is one of the largest building supply firms in the south and it operates its own sand and gravel plants to supply the markets of New Orleans and other cities near the mouth of the Mississippi river.

These silo stave bins are in no way very different from the stave silos erected in so many parts of the country for holding ensilage and other products. The diameter is somewhat greater in proportion to the height but there is no other essential difference.

They are erected in the usual way and held in place by steel rods which are fitted with the same sort of clamps for tightening that have long been familiar to the users of stave tanks and silos.

It will be noted that the screening equipment above the silos is not supported by them but rests on a steel framework. This is a much better construction than supporting such machinery on the silos, no matter what the material of which the silos may be made. The jar of the machinery is bound in time to affect the silos if the silos are used as supports.

The office of the Jahncke Service, Inc., is in New Orleans.

Shelter for Man on Picking Belt

IT pays to make a workman comfortable when he has to stay at a job that does not give him much chance to move around. If he is exposed to the sun and rain he is apt to get careless or to lay off at the wrong time.

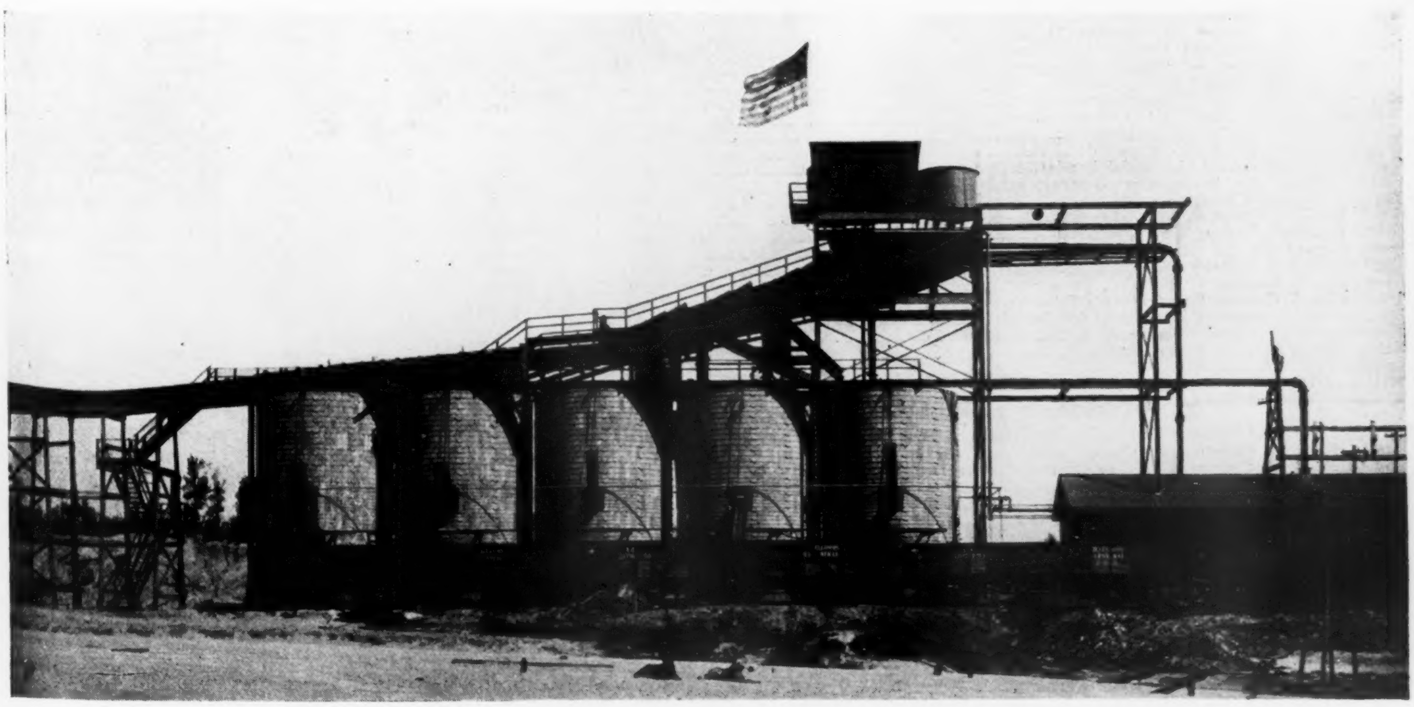
The little house built over the conveyor belt at the Massaponax Sand and Gravel Corp. plant near Fredericksburg, Va.. undoubtedly has paid for itself many times over. The man who sits in it picks roots from the bank material which is going to the washing plant. Sometimes he has nothing to do for a considerable time and at other times he is reasonably busy. But he has to be there to insure a clean product.

Picking out roots or clay balls in this

Shelter for a picking belt

way often pays big dividends on the wages so invested. The labor of a single man divided by 2500, the tons produced per day, adds little to the cost per ton that it can hardly be figured, but it means a lot to the cleanliness of the product.

The probabilities are that picking belts will come into more extensive use at sand and gravel plants to meet the constantly more exacting specifications.



Those who manufacture concrete aggregates can very well afford to demonstrate their belief in concrete by using concrete in their own construction as is done here

Financial News and Comment

International Cement's New Stock Issue

HAYDEN, STONE & CO., William R. Compton Co., Stevenson, Perry, Stacy & Co., are offering $6,750,000 in 7% cumulative preferred stock in the International Cement Corporation at $102.50 and dividend to yield 6.83%. The stock is preferred as to assets and cumulative dividends, payable quarterly on the last days of March, June, September and December; it is redeemable in whole or in part at $110 per share and accrued dividend. The cumulative annual sinking fund is 2% of the greatest amount of preferred stock at any time outstanding.

The capitalization including this issue is:

	Outstanding in hands of public
No Funded Debt	
7% Cumulative Preferred Stock (Par $100) including this issue	$10,162,200
Common Stock (without par value) 500,000 shares represented by capital and surplus as shown in Consolidated Balance Sheet as of April 30, 1925, including authorized financing	20,878,839

The following is a summary of the letter of Holger Struckmann, president:

HISTORY: The International Cement Corporation, incorporated in Maine in 1919, owns all or substantially all of the stock of ten separate companies operating ten plants located at Hudson, New York; Greencastle, Indiana; Bonner Springs, Kansas; Dallas, Texas; Houston, Texas; Birmingham, Alabama; Norfolk, Virginia; Mariel Bay, Cuba; Sierras Bayas, Argentine; and Montevideo, Uruguay. It also owns leases, covering plant site and suitable raw materials at New Orleans, Louisiana.

GROWTH: The following tabulation indicates the operating and financial position of of the corporation at the end of each year since its organization:

Dec. 31	No. of Plants	Productive Cap. in Bbls.	Net Tangible Assets	Bonds and Notes
1919	5	2,800,000	$6,507,497	$3,649,524
1920	5	3,200,000	8,845,105	2,638,938
1921	6	4,450,000	12,722,570	1,840,801
1922	6	4,450,000	13,317,546	1,627,758
1923	7	5,400,000	15,595,931	345,900
1924	7	7,000,000	19,008,917	none
1925*	10	12,000,000	33,000,000	none.

*Estimated after giving effect to financing authorized.

ASSETS: As shown by the consolidated balance sheet, as of April 30, 1925, after giving effect to the authorized financial program, net tangible assets equal $302 per share of preferred stock. The ratio of quick assets to quick liabilities is approximately 4½ to 1.

The corporation will have no bonds, notes or bank loans. The preferred stock will be followed by 500,000 shares of common stock. The common stock is now paying dividends of $4 per share per annum, and the selling price on the New York Stock Exchange indicates an equity of over $30,000,000.

EARNINGS: The following summary shows the consolidated net earnings, after depreciation, depletion and all taxes available for total annual preferred dividends of $711,354 including dividends on this issue.

	Earnings	Preferred Dividends Earned
Average Net Earnings for 5 years ended December 31, 1924	$2,040,918	2.85 times
Net Earnings for year 1924	3,047,507	4.28 times
Estimated Net Earnings for 1925 including earnings from recently acquired subsidiaries for only the last six months of the year	5,000,000	7.03 times

PURPOSE OF ISSUE: The proceeds of this issue of preferred stock are to be used to finance the acquisition of the Alabama subsidiary, the New Orleans plant site and raw material leases, and to provide funds for general corporate purposes.

The company will make application to list the preferred stock on the New York Stock Exchange.

The entire issue was taken up within a few hours after the books were opened.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co.	July 6	100	137	142	1½% quar.
Arundel Corporation (sand and gravel—new stock)	July 3	No par	31⅞	31⅞	30c quar. July 1
Arundel Corporation	Feb. 11	50	112	113½	
Atlas Portland Cement Co. (new)	July 6	No par	46	48	1% quar.
Atlas Portland Cement Co. (preferred)	June 30	100	120	....	2% quar. July 1
Bessemer Limestone and Cement Co. (common)	....	....	....	....	1½% quar. July 1
Bessemer Limestone and Cement Co. (preferred)	....	....	....	....	1¾% quar. July 1
Boston Sand & Gravel Co. (common)	June 26	100	75	75	2% quar. July 1
Boston Sand and Gravel Co. (preferred)	....	....	....	....	1¾% quar. July 1
Boston Sand and Gravel Co. (1st preferred)	....	....	....	....	2% quar. July 1
Canada Cement Co., Ltd. (common)	July 7	100	102½	103	1½% quar. July 16
Canada Cement Co. Ltd. (preferred)	June 30	100	113	....	1¾% quar. May 16
Canada Cement Co., Ltd. (serial bonds)	June 30	....	102½	....	3% semi-annual
Charles Warner Co. (lime, crushed stone, sand and gravel)	July 6	No par	22½	24	50c quar. July 10
Charles Warner Co. (preferred)	July 6	100	98	102	1¾% quar. July 23
Giant Portland Cement Co.	July 3	50	25	28	
Giant Portland Cement Co. (preferred)	June 5	50	51¼	....	3½% semi-ann. June 15
Ideal Cement Co.	July 7	No par	60	75	$1 quar. June 30
Ideal Cement Co. (preferred)	July 7	100	92	97	1¾% quar. June 30
International Cement Corporation (common)	July 7	No par	65	65¾	$1 quar. June 30
International Cement Corporation (rights on new common)	July 7	....	3¾	3⅞	
International Cement Corporation (preferred)	June 30	100	102	105	1¾% quar. June 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Kelley Island Lime & Transport Co.	July 6	100	103	105	2% quar. July 1
Lehigh Portland Cement Co.	May 9	....	70	72	1½% quar. Apr. 1
Michigan Limestone and Chemical Co. (preferred)	....	100	....	....	1¾% quar. July 15
Missouri Portland Cement Co.	July 7	25	71	71½	31½c quar. June 1; 25c ex. June 1
Missouri Portland Cement Co. (serial bonds)	May 29	....	104½	104½	3¼% semi-annual
Pacific Portland Cement Co., Consolidated	July 3	....	81	82	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)	July 3	100	100	100	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	July 3	10	8	8¾	
Petoskey Portland Cement Co.*	July 3	10	9¼	10¼	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	....	100	....	....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	July 6	100	98	....	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)	July 6	100	70	....	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)	July 6	No par	70	....	1½% quar. Aug. 1
Sandusky Portland Cement Co. (common)*	July 3	100	108	112	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds)	May 8	....	103½	....	6% annual
Santa Cruz Portland Cement Co. (common)	June 6	50	64½	....	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	....	120	
United States Gypsum Co. (common)	July 7	20	164	165	2% quar. June 30; $1 ex. June 1
United States Gypsum Co. (preferred)	July 3	100	115	116	1¾% quar. June 30
Universal Gypsum Co. (common)†	July 9	No par	18	21	
Universal Gypsum Co. (serial bonds due 1925-27)†	July 9	....	99 (price to yield 6½%)		
Wabash Portland Cement Co.*	July 3	50	50	100	
Wolverine Portland Cement Co.	July 6	10	11	11¼	2% quar.

*Quotations by Watling, Lerchen & Co., Detroit, Mich.
†Quotations by True, Webber & Co., Chicago.

Editorial Comment

Rock Products Securities

Among other good reasons for ROCK PRODUCTS' pages of financial news is the proof they evidence of the growing recognition of these industries by reputable bankers and investment houses. Surely crushed stone, sand and gravel producers who have noted and read the announcements of the bond offerings through bankers by the Connecticut Quarries Co., the Canada Crushed Stone Corp., Ltd., the Union Rock Co., the Lyman-Richey Sand and Gravel Co., the Construction Materials Co., and others, in recent issues of ROCK PRODUCTS, must now realize that they can no longer say, as they did not so long ago, that bankers will not look upon their properties as worthy of consideration.

There is another object to be gained by the publication of this financial news, and that object can be and should be promoted by every single legitimate operator in the rock products industries. That object is to prove to would-be investors in these industries that there are legitimate opportunities for investment in tried and trustworthy enterprises, capably managed; and that such would-be investors do not need to buy stock in purely promotional projects in order to place their money in these industries.

We feel certain that the opening up of these industries to the ordinary investor, with the attendant publicity necessary as regards earnings and balance sheets, will do the industry a world of good by keeping investors from hazarding their savings in purely promotional enterprises. For whenever an industry is made up largely of individual owners and closed corporations there is always an exceptional opportunity for promoters. Earnings and financial statements are not known and promoters may, and always do, allege all kinds of profits for the industry as a whole, as well as for the particular project they are promoting.

State Mis-Management

Since states, counties and municipalities are going into the operation of gravel pits, quarries and the manufacture of cement, it is fair to investigate the past performance of such bodies in operating and managing industries of one sort and another. It is of course, admitted that the public loses money under such control and ownership. Even the most active proponents of state, county and municipal ownership have hardly dared to deny this, placing the advantage to the public on other grounds than that of economy. But it has always been difficult to find definite figures which would show how inefficient such enterprises really are. Books have usually been kept in such a way as to disguise the facts, or the accounting systems have been so inaccurate as to be unsuitable for cost analysis.

The Associated General Contractors of America has therefore rendered a public service in finding 16 jobs which were carried on by state, municipal or federal government bodies in which costs were kept in such a way that they could be analyzed and in analyzing these jobs. Nine of them were municipal, three were state and four federal government jobs, and these included such work as bridges, highways, schools and public garages. The total cost of the work analyzed was actually $140,090,000. The engineers' estimates, or the contractors' bids, for this same work totalled $73,434,000. There is thus a difference of $66,656,000 which it is fair to consider as lost through uneconomical management.

It seems incredible to one who is uninitiated that such an enormous sum could be lost by mismanagement, but anyone who has had charge of a plant or a construction job understands it. The employing of two men where one would do, the slowing down of the work because of delayed delivery of material, the heavy overhead from too many bosses and too large an accounting force, the working at cross purposes because of no one with sufficient authority to make final decisions and the red tape that ties and tangles everything at the most inconvenient time, these are a few of the ways by which money may be lost at a surprising rate. Graft is always the first thing thought of in connection with public expenditures, but it is not graft, it is inefficiency that loses most of the public money.

Specifications For Cement

A testing engineer, quoted elsewhere in this issue, says: "Much better results would be possible if such mills would exercise more meticulous control over their products." Just to be sure we looked up *meticulous* in Webster's, and found "meticulous 1. Timid; fearful; 2. unduly or excessively careful of small details or about comparatively unimportant matters." We mistrust that this expresses the attitude of many testing engineers more accurately than the speaker intended. After all, the chief objective in making portland cement is to attain a fairly reliable, standard commodity on a production basis that permits a low price and extensive use. In attaining this end the American portland cement industry has made a record that any and all other industries may well envy.

To be sure a higher quality of cement is desirable and is being slowly but surely attained, not so much, however, by specification requirements to meet tests as by competition between manufacturers for reputation and quality—which is as it should be.

National Crushed Stone Association Sets Forth Accomplishments and Objectives

Drive for Membership Is On

As announced in our issue of June 27, page 62, Col. R. B. Tyler, chairman of the membership committee of the National Crushed Stone Association, is marshaling his members for a drive for new members. A recent bulletin of the association lists the accomplishments and objectives of the organization as follows:

What It Has Done

1. *Co-operated* with local and state associations.
2. *Intervened* in I. C. C. proceedings to prevent other aggregates from getting lower freight rates than stone.
3. *Assisted* in getting better car service and demurrage charges.
4. *Won* greater recognition for crushed stone industry at Washington.
5. *Opposed repeal* of Agent Kelly's Tariff No. 228, until complete joint through rates were established, in lieu thereof and on same basis.
6. *Given a helping hand* to all our members, regardless of the size of their plant and tonnage.
7. *Made national bulletin* useful as an agency in giving news and suggestions to N. C. S. A. members.
8. *Promoted* the superior merits of stone as a mineral aggregate and ballast as compared with any other material.
9. *Established friendly relations* with (a) railroads (b) state highway departments; (c) U. S. Bureau of Roads; (d) Interstate Commerce Commission; (e) National Highway Research Board.
10. *Discussed and investgiated* (a) labor difficulties; (b) causes of high liability insurance rates; (c) production costs; (d) employes welfare; (e) electrification of plants; (f) salesmanship problems; (g) new uses for crushed stone.
11. *Established* through manufacturers' division a splendid exposition in connection with our annual conventions, whereby crushed stone operators may see the models of the latest equipment for quarry operation and meet the men who make and sell machinery and supplies. This personal contact has been highly profitable to many of our members.
12. *Grown a friendship* and a fellowship that never existed among quarrymen before, and as a result there is now a spirit of co-operation and respect for competitors that has long been lacking and much needed.

Otho M. Graves, President, National Crushed Stone Association

What It May Do

1. *Research* and promotion work.
2. *Avoid* anything that will incur disfavor of federal or state government.
3. *Encourage* quarrymen to organize locally and solve problems of mutual interest.
4. *Give* our organization a national prestige and win a recognition that is our due.
5. *Help* our standardization committee work out uniform standards of quarry tools especially drilling equipment.
6. *To discover* the magnitude and importance of the crushed stone industry, unite quarrymen and escape the perils of being unorganized.
7. *Co-operate* with machinery makers and jointly endeavor to reduce production cost, increase safety, lessen death and accident records.
8. *Arrange* annual convention programs that will develop expression of the keenest thought of men on matters pertaining to various phases of our industry.
9. *Publish* in book form annual convention proceedings.
10. *Take* an interest in (a) legislation; (b) I. C. C. orders; (c) priority movements; (d) freight rates; (e) distribution of open-top cars; (f) fuel and matters of general importance.
11. *Endeavor* to have commercial and industrial organizations give us a place on their programs so that we may relate how crushed stone ramifies into many channels of human activity.
12. *Promote* and stimulate tests to more fully and completely ascertain the relative limits of usefulness of the several concrete aggregates.
13. *Seek* representation in technical societies and on boards where we may do our share in promoting the merits of crushed stone when engineers and architects make up programs for railway ballast, highway building and mineral aggregate standards for all kinds of general construction.
14. *Teach* the lesson that sane organization is the surest and cheapest way to promote and protect the welfare of those who are engaged in the crushed stone industry.

Pan-American Road Congress

The tentative itinerary of the official United States delegation to the Pan-American Road Congress at Buenos Aires, October 3-13, has been announced. The delegation will leave from New York, September 3, on the Grace Line steamer *Santa Ana,* going by way of the Panama Canal and the west coast of South America as far as Valparaiso.

Official calls will be made on the governments of Panama, Peru and Chile by the party on the way to the congress. The delegation will visit Sao Paulo and Rio de Janeiro, Brazil, on the return trip and arrive at New York on November 11.

The official delegation is headed by J. Walter Drake, Assistant Secretary of Commerce. Its other members are Thomas H. MacDonald, Chief of the Bureau of Public Roads, Department of Agriculture; Dr. Guillermo A. Sherwell, secretary-general of the Inter-American Highway Commission; Frank Page, chairman of the North Carolina State Highway Commission; Charles M. Babcock, Commissioner of Highways, Minnesota; Frederick L. Bishop, dean of the School of Engineering, University of Pittsburgh, and William E. Hull, member of Congress from Illinois.

Gypsum Manufacturers Inspect "Structolite" Building

Also Hold Meeting of Association at Atlantic City

DURING the recent meeting of the Gypsum Industries at Atlantic City, N. J., a visit was made to Brigantine Beach, a new development, about 12 miles from Atlantic City, to examine a garage which was being built of "Structolite." This is a form of gypsum concrete which has been developed by the United States Gypsum Co. and which is beginning to find a considerable use in building dwellings, warehouses, garages and other buildings which do not run to a great height. It was described in ROCK PRODUCTS for December 13, 1924.

The garage at Brigantine Beach was designed for brick construction and the substitution of structolite for brick for the curtain walls was made at the last minute. Hence the building is really a composite structure, having brick columns and structolite walls between them. The walls are 6 in. thick and are cast in the usual way in sectional steel forms which are 2 ft. square. These are locked together at the edges so that any multpile of 2x2 ft. may be cast.

The mixture used was 1½-1-3, that is 1½ of structolite gypsum, 1 of sand and 3 of pebbles. Sand and pebbles were obtained from a local dealer, the pebbles being from 1½-in. down. The mixing was done by hand. Machine mixing may be employed, but it was stated that the mixing time must be less than that of portland cement concrete. Reinforcing rods are placed over the doors and windows.

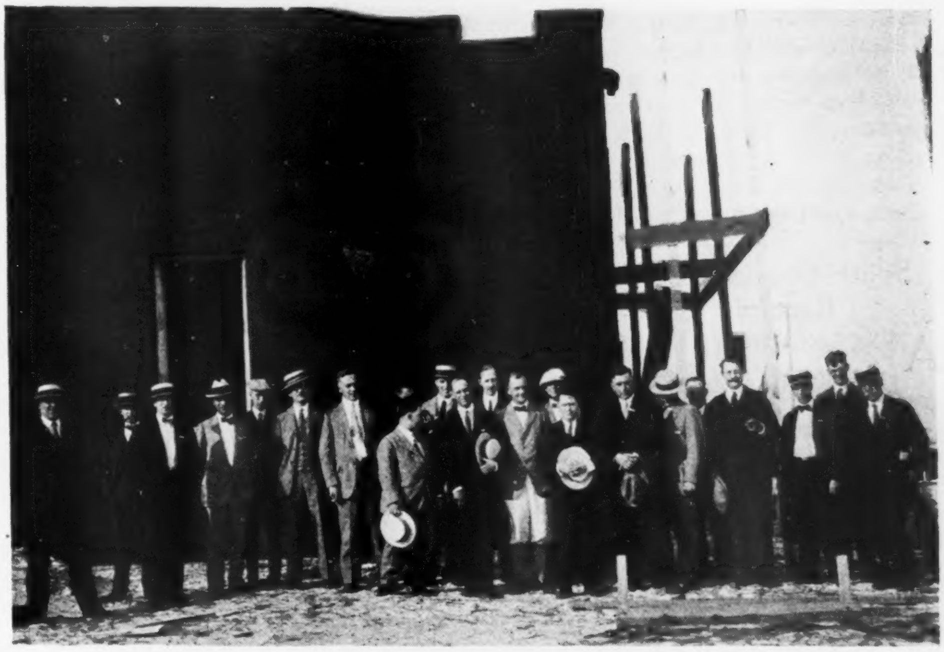
To show the working of the process a set of forms was put together to make a section of 6 in. wall and the structolite, for it was mixed and poured. The consistency seemed to be about that of portland cement concrete with a 4-in. slump. Where the structolite is tamped after being placed in the forms, the outer surfaces are very smooth and for such a building they will serve without interior plastering.

The outer walls of this building are coated with R. I. W. paint, which is a waterproofing compound. They will be given an outside covering, a part of the building being finished with portland cement stucco.

The advantages of structolite as a building material are first of all its quick setting properties. The forms can be stripped in 20 minutes after the pour has been completed and raised to make a section above. Common labor does all the work and no special skill is needed. Strucolite has very high qualities as an insulator, preventing the passage of heat and cold, and hence a thinner wall will serve than would be required of some other building materials. The insulating properties are fully explained in the ROCK PRODUCTS article referred to.

To cost of course depends on the locality, as the cost of the aggregate used varies widely in different parts of country. Sand and crushed stone and sand and gravel are used as aggregates and crushed slag would serve equally well. In fact, structolite concrete does not differ from portland cement concrete in that regard.

The party gypsum manufacturers was shown photographs of a number of houses recently built of structolite in different parts of the United States. Some towns which have a number of such houses are Cohoes and Yonkers, N. Y., and Joliet, Ill.



Gypsum manufacturers inspect "structolite" building near Atlantic City

Garage with "structolite" walls under construction

Interior view showing brick columns and gypsum panels

Foreign Cement Barred from City Work at Los Angeles

ON recommendation of the city engineer and the public works committee, the Los Angeles, Calif., city council recently ordered exclusion from public work of foreign manufactured cement until such time as they will conform to city specifications and ordinances.

The committee pointed out that in his recommendation that foreign cement be barred on city work, the city engineer maintained that in many instances the sacks did not come to the required weight, that a system of abuses has grown up, among the more important of which are what is known as the reconditioning of cement.—*Los Angeles Examiner.*

International Buys Phoenix, Birmingham, Plant

THE International Cement Corporation has purchased the plant of the Phoenix Portland Cement Co., at Birmingham, Ala., and its plant site and deposits at New Orleans, La., through its newly incorporated subsidiary, the Alabama Portland Cement Co.

Details of the financing of this acquisition appear elsewhere in this issue.

South Dakota Cement Plant Receipts for May

ANNOUNCEMENT by Elmer Thrope, member of the cement commission, states that the total cash receipts of the South Dakota State cement plant located near Rapid City, S. D., for the month of May were $68,955. This amount is an increase of $6,034 over April receipts. There are outstanding accounts, practically all of which will be paid in the next 10 days, to the amount of over $49,500. Shipments during the past week have averaged 2,222 bbl. daily, the largest days shipment being 3,225 bbl.—*Sioux City (Iowa) Journal.*

American Cement Admitted Duty Free Into Russia

AMERICAN cement is now admitted duty free into the Soviet Union according to Order No. 63 of the People's Commissariat of Foreign Trade, a copy of which has just been received by the Russian Information Bureau in Washington, D. C.

The order relating to American cement was published by the Customs Tariff Committee of the Commissariat of Foreign Trade at the end of April, as a result of a decree of the Council of People's Commissars, adopted in March, reading as follows:

"The Customs Tariff Committee is empowered to establish the duty-free entry of cement into the Union of S. S. R. when imported directly from nations permitting cement from the Union of S. S. R. to enter their own territories duty free.

Staff Conferences for Sales Promotion

The Structural Slate Company, Pen Argyl, Pennsylvania, Believes in Them

LATE in May, the Structural Slate Co., Pen Argyl, Penn., held a three-day sales conference, attended by the managers of its branch offices from all over the country. Questions dealing with contact with architects, workmanship and the marketing of the new product, known as "Struco Slate," were discussed at length. Another important point brought out at the conference was the necessity for making a revision and addition to the standard types of toilet enclosures and shower stalls, to meet changing conditions.

The opening session was in charge of Wm. A. Kitto, general manager for the company. Each salesman was called upon to report conditions in his territory and to outline his expectations for the coming year. These sales forecasts, when tabulated, indicated that 1925 would be one of the best years in the history of the slate industry. The use of structural slate for shower stalls, toilet partitions, treads, base, wainscoting and sills is rapidly gaining favor among architects and builders, due to the excellent natural characteristics of slate and the intensive personal work done by the salesmen in all branches of the building profession. The afternoon meeting was thrown open to a general discussion of technical matters, dealing largely with changes in methods of estimating.

On Thursday, D. Knickerbacker Boyd, consulting architect of Philadelphia, presided as chairman. A general discussion on methods of approaching and interviewing architects was held. Many valuable contributions were given from the experiences of the men in their personal work. Much of this material was incorporated in a report that will be distributed to the various offices.

In the afternoon new methods of constructing toilet enclosures and shower stalls were discussed, as some changes were necessary to meet varying conditions. It has been found that by making a few minor alterations in certain standard fixtures it will be possible to furnish the trade with installations that are sanitary and durable in every respect at a considerably lower price. Here again the experiences of the salesmen proved invaluable and it was mainly from their suggestions that Mr. Boyd secured the necessary information to make an addition to the Standard Specifications on Slate, which are issued by this company. These additional specifications will be available for distribution in the near future.

A most valuable and interesting meeting was held Thursday evening starting at 6:30 with a chicken and waffle dinner at Wheeler's hotel, Bartonville, Penn. At all previous meetings only the salesmen and officers of the company were present, but this session included the operators and mill foremen. Its purpose was to give the operators and foremen first hand information concerning the problems that confront the salesmen, and by this means secure greater co-operation and better workmanship with a view to raising the standards of quality and service in the industry. Talks were given by members of each group, and included much constructive criticism which was received in the manner in which it was intended. The meeting was a great success and everyone feels that they benefited by the frank discussions.

Friday morning the men assembled at the factory, which has just been completed, for the manufacture of "Struco Slate," a new product put out by the Structural Slate Co. "Struco Slate" is natural slate that has been given a beautiful, hard, permanent finish in any color by means of molding the color over the slate under air pressure. Demonstrations were given showing how the various finishes are applied and then the meeting adjourned, to gather again at the office. N. M. Male, the president of the company, presidde for this final session. Technical information concerning this new finish and methods for placing it on the market were discussed. One of the main points was the emphasis laid on the fact that "Struco Slate" has been developed merely to enable architects to use slate in carrying out color schemes and in rooms that are too dark to permit the use of natural slate. "Struco" finish merely lends a new beauty and utility to a product which naturally meets the architect's requirements for sanitation and durability. The salesmen were highly pleased with this product and feel sure that it will meet with unqualified approval and success among the trade.

It is needless to say that, aside from the valuable interchange of ideas, the men greatly enjoyed meeting their fellow salesmen and were unanimous in voting the conference a great success.

Petoskey Cement Doubles Output

THE Petoskey Portland Cement Co. has completed and placed in operation additional equipment doubling the capacity of its plant at Petoskey, Mich., giving it an annual production of 1,500,000 bbl. annually.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

A Concrete Products Plant Which Will Interest Sand Producers

Bernardsville Concrete Products Company Installs a Well Designed Sand Plant for Producing Aggregate for Its Special Products Machines

HERE is a cement products plant that will interest the sand producer as much as the products man. The Bernardsville Concrete Products Co. at Bernardsville, near Morristown, N. J., has put in a sand washing plant which contains some novel features that will be of interest to everyone in the sand business.

The plant is new but the head of the company, John C. Zeidler, is by no means new to the concrete business. In addition to the Bernardsville plant he controls and directs the St. Joseph Reinforced Concrete Co., St. Joseph, Mo., the J. L. Zeidler Concrete Pipe Works, Joplin, Mo., and the Pioneer Manufacturing Co. of Waterloo, Iowa, which is now known as the Zeidler Concrete Products Machinery Co.

The new plant will produce its own aggregate from a pit at one side of the building. This aggregate will be washed sand containing small pebbles and it is to be made in the most nearly unique washing plant which has been noted in connection with a products plant.

The sand will be brought in by a scraper from the pit and dumped to the hopper of a bucket and belt elevator. This raises it to a box in which water is added. Water and sand flow over a gravity screen to take out any roots and coarse pieces and the undersize of this screen goes to a Boylan classifier. The Boylan classifier is a machine much used in the zinc mills around Joplin, Mo., for classifying sand into sizes. It works on the balancing principle and discharges the sand in a dewatered condition. Rising current water may be applied to clean the sand more thoroughly than could be done by simple dewatering and also to lift out any unwanted fines.

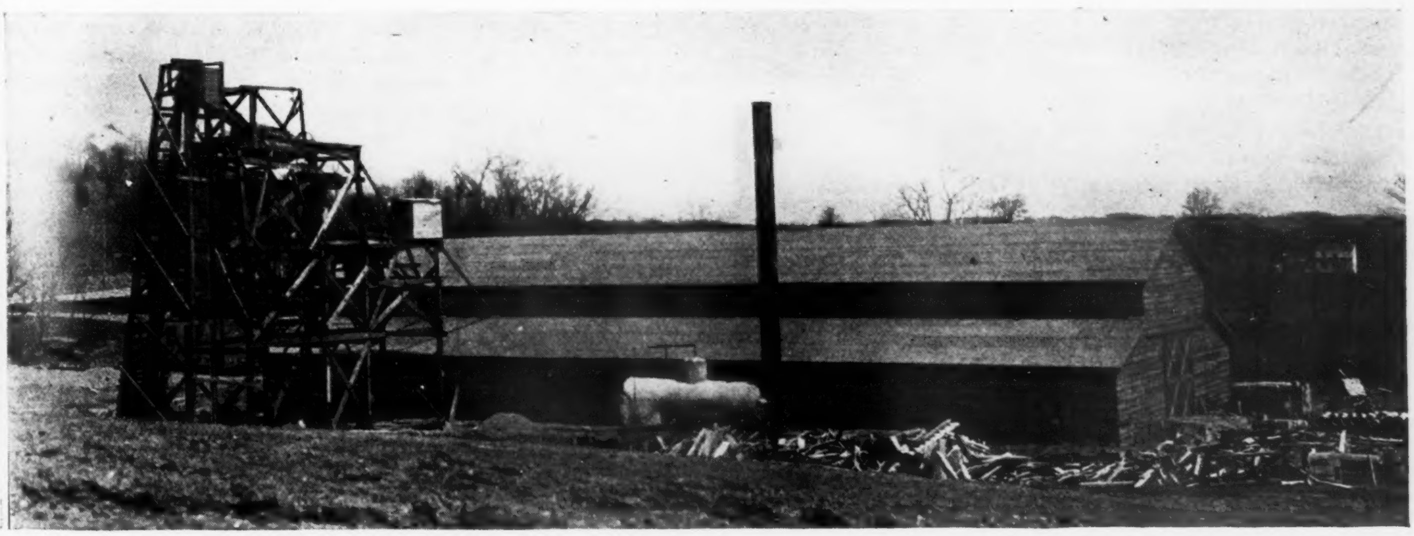
After being washed and classified the sand is screened through a short revolving screen and the products of the screen are sent to the aggregate bins.

The pipe and block machines, all of which are of Mr. Zeidler's design and make, are housed in a long single-story building. About half of the space is taken by the machines and accessories and the balance is divided into steam curing rooms. Three tracks in front of the machines carry trucks on which the pellets and finished product are sent to be steam cured.

In both block and pipe machines the mold revolves and centrifugal force drives the concrete to the outer face of the mold. At the same time packers on the inside of the mold pack and press the concrete from the central core outwardly, thus completing the work begun by centrifugal force. The result is that the concrete is not only formed under considerable pressure but urged to flow in the direction of the pressure and a very hard and dense concrete is made.

This is especially useful in making concrete pipe, which should be impermeable to water at low pressures. Mr. Zeidler claims that his pipe is impermeable to water under 12 lb. pressure, which is much more than concrete pipe is ever called upon to stand. When the pipe is broken across, the section has the texture and appearance of granite.

The plant was not quite completed when it was visited by a Rock Products editor



The Bernardsville (New Jersey) Concrete Products Co.'s plant, showing the sand washing plant at the left of the picture

recently, so it was not producing. But Mr. Zeidler started up one of the pipe machines to show how it worked. Four cast iron pallets or cast iron bases were placed on a revolving plate at the bottom of the machine. This plate worked with a step-by-step motion so as to bring these bases in succession under the machine. A cylindrical mold was placed on a base and it went into the machine, taking a charge of mixed concrete from a small conveyor. This conveyor can be set to deliver just the right amount of

One of the machines for making pipe

concrete for a pipe. At the same time the pipe revolved so as to throw the concrete against the side of the cylinder. A revolving shaft carrying a cylindrical piece and the packing arms or wings descended into the cylinder and as it rose slowly the packing arms forced the concrete outwardly in the same way that it was urged to go by centrifugal force. As soon as the shaft passed the top of the cylinder, the step-by-step motion of the plate below brought the next cylinder and base into position to be filled with concrete and packed.

The pipe was placed on a truck and the cylinder stripped at once. The pipe standing on its cast iron base was then ready for curing in the steam room. The cast iron base could not be used for another pipe until the pipe had been steam cured but the cylindrical molds may be stripped at once and used for another joint of pipe.

The block machine has two shafts provided with packing arms and makes a double cylindrical cored hole. The same packing actión and centrifugal force is employed and the result is a block of very firm texture. The photograph shows two views of a block, one showing the core holes and the other the very smooth side of the block.

The plant is in a locality where there is a great deal of building projected and in progress. Mr. Zeidler during the visit pointed out a truck loaded with block which was passing and said that he knew that the block were being shipped 27 miles from a point in another town. This gave some idea of the territory in which the new plant will find a market for its product.

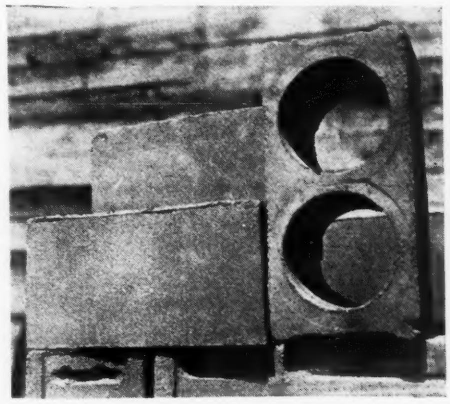
Iowa Cement Products Notes

A MODEL concrete block house is to be built in Davenport to stimulate the use of blocks in dwelling construction.

All plants in Cedar Rapids have put in new machinery and are increasing production. Better quality blocks are being made.

The Zeidler Concrete Products and Machinery Co. of Waterloo, has opened the old concrete sewer pipe plant in Waterloo and will make pipe block and fence posts. The Waterloo Concrete Corp. is making staves and erecting concrete silos. Competition in the block business in Waterloo is said to be unreasonable.

O. B. Lofstedt of the Modern Construction Co., Grand Junction, put on an interesting show of his own at that place on Wednesday, April 29. In the afternoon his show was put on in the high school auditorium and in the evening in the Legion Hall before about 200 people. Four reels of pictures on the manufacture of cement and the application and uses of stucco were shown. Mr. Dowell gave a talk on the uses of cement and concrete products. Much interest



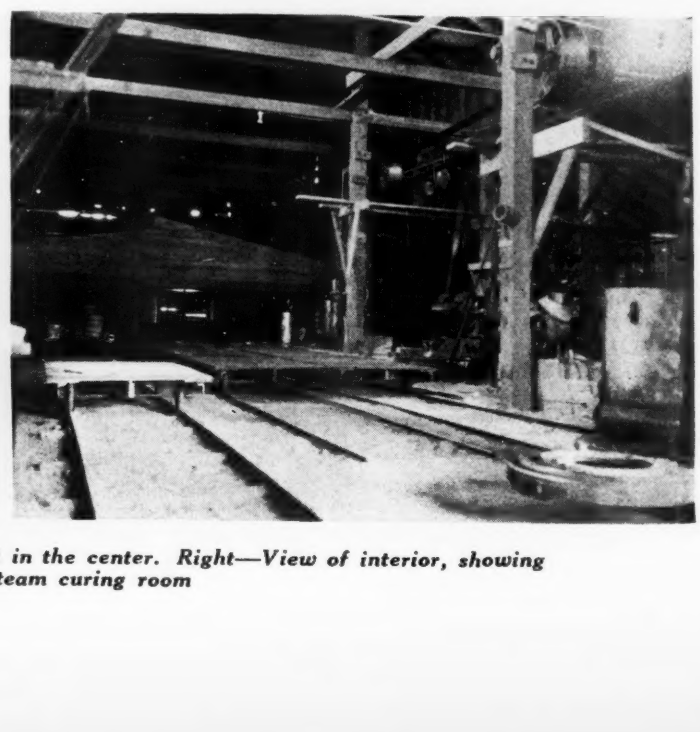
The smooth faced block

was shown and results indicate that the advertising was worth while.—*Iowa Concrete Products.*

New Administration May Cause Road Building Boom in Cuba

THE recent inauguration of General Gerardo Machado as president of Cuba begins a new era in the construction of roads in that country, in the opinion of officials of the Pan-American Confederation of Highway Education. A prominent feature in the platform on which he was elected was the advocacy of a system of first-class highways throughout the country.

Adolpho R. Arellano, president of the Cuba National Association of Highway Education, has done much to sustain national interest in the matter by circulating literature on the cost of hard surface roads and the necessity for them.



Left—The washing plant. The classifier is about in the center. Right—View of interior, showing entrance to the steam curing room

Slag Fellowship in Highway Engineering Established at Michigan University

THE National Slag Association, with headquarters at Cleveland, Ohio, has recently established a Fellowship in Highway Engineering to provide for the investigation under the direction of the Division of Highway Engineering and Highway Transport of the University of Michigan of an approved subject relative to the utilization of blast furnace slag in the construction and maintenance of roads and pavements. The National Slag Association Fellow will make extensive investigations in the laboratory relative to the properties of slag and in the field pertaining to results secured by the utilization of slag in the construction of different kinds of roads and pavements.

Four Eastern Soapstone Companies Merge

SEVERAL months of negotiations were concluded recently when papers were signed and approved by counsel for the concerns interested. The transactions cover the taking over by the Armstrong Products Corporation, 42 Broadway, New York, of the Phoenix Soapstone Co., the Maryland Soapstone Co. and the Virginia Chesapeake Soapstone Corporation, and as an added facility the absorbing corporation also acquired a railroad which supplies interconnecting quarry transportation and connects with the Southern Ry.

The Armstrong Products Corporation through these acquisitions will not only have a sufficient quantity of merchantable soapstone that should last for a hundred years or more, but will have transportation facilities, important trade names, etc., which have been before the public for over 20 years as have the products supplied to users of soapstone.

The Phoenix and the Virginia Chesapeake Soapstone companies are located near Arrington, Nelson county, Virginia, on the main line of the Southern Ry., and the Maryland Soapstone Co. is located about 25 miles from Baltimore on the main freight line of the B. & O. R. R. All these companies have been and are in operation, and through this absorption the Armstrong Products Corporation expects to enlarge the capacity of each plant in order to meet the demand for soapstone and its products which is constantly increasing in volume.

The Maryland Soapstone Co. will continue to manufacture pulverized soapstone, or talc, for local as well as export purposes. The Phoenix and Virginia Chesapeake plants are to continue in the quarrying of blocks, slabs and sundry items which will in turn be fabricated by them into items ready for its users.

William P. Benjamin, president, director and engineer in charge; Thomas H. Armstrong, vice-president, director and manager of plants; Oscar M. Gerstrung, secretary-treasurer and director; William A. Maltus, director, and Will T. Snyder, director, constitute the executive personnel of the Armstrong company.

Growth of British Columbia Gypsum Industry Rumored

AN early development of the rich gypsum deposits in British Columbia seems likely to follow the present demand in the Far East and Oceania, especially conspicuous in Australia and New Zealand. It is reported that orders are already booked from that vicinity for 1,000,000 ft. of wall board. The manufacturers anticipate a much larger call, running perhaps to 2,000,000 or 3,000,000 ft.—*New York Times.*

Certain-teed Products Enlarging Acme, Texas, Plant

A SURVEY has been taken and the ground staked off for an addition to the Acme, Texas, plant of the Certain-teed Products Corp. for the manufacture of gypsum wall-board. It will be placed between the broom mill and the power house.

This plant will offer employment to about a hundred more men.—*Tuanah (Texas) Chief.*

Phoenix Receivership Terminated by Court

RECEIVERSHIP of the Phoenix-Portland Cement Co. of Ohio, Dollings subsidiary, which has existed nearly two years, terminated recently and property and assets of the company were restored to management of its officers and directors by Judge Robert P. Duncan of Franklin county, Ohio, Common Pleas Court, upon recommendation of the receiver, Freeman T. Eagleson.

Total disbursements during that period, as reported by the receiver, were $199,074, including the fees and settlement of a claim of $115,950.27 to the American Trust Co., through the law firm of Wilson & Rector. Income tax amounted to $4801.28. The assets amounted to $248,156.52, consisting chiefly of royalties for cement manufactured at the plant at Birmingham, Ala. A balance of $49,082.52 was reported.

The concern has been allowed a claim of $377,746.55 against receivers of the R. L. Dollings Co. of Ohio, for stock sold. The Phoenix-Portland Cement Co. is reasonably assured that a stabilized income will be regularly paid and that the property involved will be kept adequately insured and maintained in first-class condition, the receiver stated.

Ninety per cent of the preferred stock, which has a market value of $85 per share, and practically all of the outstanding common stock is owned by the Girard National Bank, Philadelphia, as trustee, or by Charles M. Conn, according to the report.—*Columbus (Ohio) State Journal.*

Oregon Sets Royalty on Sand and Gravel from Rivers at Ten Cents per Yard

ALL individuals, firms or corporations taking sand and gravel from the navigable streams in Oregon will be required to pay royalty to the state at the rate of 10 cents a cubic yard.

This was announced by the state land board after it had entered into contracts with eight corporations in Portland which are desirous of obtaining sand and gravel from the Willamette river. In the future the land board will assert its rights below the high water mark, and all applicants for contracts will be treated in common.—*Portland (Ore.) Oregonian.*

Idaho Asbestos Company to Spend $1,000,000 on Plant Improvements

A MILLION DOLLAR expenditure was authorized on its Idaho property by the United Products Asbestos Co. at its directors' meeting held recently in New York. Three new directors were appointed, Victor Austin of Idaho Falls, Idaho; Dr. G. Bailey of Sharon, Penn., and Herman W. Booth of New York. The plan is to run an electric power line from the mines west of Yellowstone to Big Springs, a distance of 30 miles, and equip the mine with new machinery, which has already been ordered and is in course of construction. It is intended to have an output of 200,000 tons of fiber a year. After the machinery is installed the mines will be able to work practically the year around.—*Boise (Idaho) Statesman.*

Price of Crude Rubber Up

ON July 9 the price of crude rubber jumped to 97c per lb. at New York City. One year ago it was 20c. This is going to have a marked effect on the rock products industries which are large consumers of conveyor belting and automobile-truck tires. Current prices of rock products should take account of the increased cost of many plant necessities in which rubber is a very considerable item.

Sandusky Cement Dividends

THE Sandusky Portland Cement Co., Sandusky, Ohio, has initiated dividends on its doubled capital at $2 quarterly or $8 per annum. This is equal to $16 a share on the old, which received $12 dividends last year.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	1.00	....	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	1.25
Northern New Jersey	1.60	1.50@1.80	1.80@2.00	1.40@1.60	1.40@1.60	....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	....
Walford, Penn.	1.00	1.30	....	1.50h	1.50h	....
Watertown, N. Y.	....	.50	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	....	1.85	....	....	....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.00	....	1.15	.95	1.00	1.00
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.20	1.20	1.20	1.10	1.10	1.10
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	1.05	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.30	1.15	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Northern New Jersey	1.30	....	1.80	1.60	1.40	....
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	....	....	1.10	....
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	....	1.20†	1.10	1.05	....
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	....	1.00@1.15	.90@1.05	.90@1.05	....
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	....
Bridgeport and Chico, Texas	1.00	1.35	1.25	1.25	1.20	1.10
Cartersville, Ga.	1.65	1.65	1.65	1.35	1.35	....
El Paso, Texas	1.00	1.00	1.00	1.00	....	....
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	....
Graystone, Ala.	Crusher run fluxing stone, 1.00 per net ton					
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	1.00	....	....	1.25	1.00	....
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.10	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	....	1.25	1.25	1.10	....
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.50	1.35	1.35	1.35	1.25	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50@1.75	2.00@2.25	1.50@1.80	1.40@1.70	1.40@1.60	....
Oakland and El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	....
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	....
Springfield, N. J.	1.70	2.00	2.00	1.70	1.60	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwater, N. Y.—Dolomite	1.50 all sizes					
Columbia, S. C.—Granite	.50	1.75	1.75	....	1.60	....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	1.50@1.75	1.50	1.50	1.25	1.15	1.15
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.—Granite	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	....
Richmond, Calif. (Basalt)	.75*	....	1.50*	1.50*	1.50*	....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼-in. (g) 2-in. (h) less 10c discount.

Agricultural Limestone
(Pulverized)

Alton, Ill. — Analysis, 97% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh		4.00
Pulverized		1.85
Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk		2.75
Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)		5.00
Cape Girardeau, Mo.—Analysis, 93.5% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 90% thru 50 mesh		1.50
Cartersville, Ga. — Analysis, 68% $CaCO_3$; 32% $MgCO_3$; 50% thru 100 mesh		1.50
Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk		2.50
Chico, Texas—Pulverized		2.50
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk		4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk		3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk		3.00
Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacked		5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk		2.50
Knoxville, Tenn. — Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk		2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk		2.75
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk		3.60
Marion, Va. — Analysis, 90% $CaCO_3$, guaranteed; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton		2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@	4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags		5.00
Olive Hill, Ky. — Analysis, 90% or more $CaCO_3$; pulverized, bags, 4.00; bulk		2.00
Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)		5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@	2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk		3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk		5.50
Rocky Point, Va. — Analysis, 95% $CaCO_3$; 50% thru 200 mesh	1.75@	2.00
Asphalt filler dust, 80% thru 200 mesh	3.00@	3.50
Waukesha, Wis.—90% thru 100 mesh		4.00
Watertown, N. Y.—Analysis 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk		2.50
West Stockbridge, Mass.—Pulverized; paper bags, 4.10; cloth, 4.60; bulk		2.85

Agricultural Limestone
(Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Bedford, Ind. — Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.60
Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—99% $CaCO_3$; 90% thru 4 mesh	1.00
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50

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Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh		.80
Chico, Texas — 50% thru 50 mesh, 50% thru 4 mesh		1.00
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh		1.20
Cypress, Ill.—90% thru 100 mesh		1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh		1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh		1.50
Garrett, Okla.—All sizes		1.25
Gary, Ill. — Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh		.60
Kansas City, Mo. — 50% thru 50 mesh		1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh		2.00
Screenings (¼ in. to dust)		1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk		1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@	2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind. — Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh		1.60
Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh	1.45@	1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh		1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh		1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@	1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh		.75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk		2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk		3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@	3.50
Rocky Point, Va.—80% thru 200 mesh	3.00@	3.50
Waukesha, Wis.—97% thru 100 mesh, bulk		4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:		
Berkeley Springs, W. Va.		2.25
Cedarville and S. Vineland, N. J.—		
Damp		1.75
Dry		2.25
Cheshire, Mass.:		
6.00 to 7.00 per ton; bbl.		2.50
Columbus, Ohio		1.25
Estill Springs and Sewanee, Tenn.		1.50
Franklin, Penn.		2.00
Gray Summit and Klondike, Mo.	1.75@	2.00
Los Angeles, Calif.—Washed		5.00
Mapleton Depot, Penn.	2.00@	2.25
Massillon, Ohio		3.00
Mineral Ridge and Ohlton, Ohio		2.50
Oceanside, Calif.		3.00
Ottawa, Ill.—Chemical and mesh guaranteed		1.50
Pittsburgh, Penn.—Dry		4.00
Damp		3.00
Red Wing, Minn.:		
Bank run		1.50
Ridgway, Penn.		1.90
Rockwood, Mich.	2.75@	3.25
Round Top, Md.		2.25
San Francisco, Calif.	4.00@	5.00
St. Louis, Mo.		2.00
Sewanee, Tenn.		1.50
Thayers, Penn.		2.50
Utica, Ill.	1.00@	1.25
Zanesville, Ohio		2.50
Miscellaneous Sands:		
Aetna, Ind.:		
Core, Box cars, net, .35; open-top cars		.30
Albany, N. Y.:		
Molding fine and coarse		2.00
Brass molding		2.25
Sand blast		3.60
Arenzville and Tamalco, Ill.:		
Molding fine and coarse	1.40@	1.60
Brass molding		1.75
Beach City, Ohio:		
Core		1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buaffalo, N. Y.	1.10	.95	....	....	.85	....
Erie, Penn.	....	1.25	....	1.50	1.75	....
Farmingdale, N. J.	.58	.48	1.05	1.20	1.10	....
Hartford, Conn.	.65*	....	....	....	....	....
Machias Jct., N. Y.	....	.75	.75	.75	.75	.75
Montoursville, Penn.	1.00	1.10	.90	.85	.85	.85
Northern New Jersey	....	.50	1.00@1.50	1.00@1.25	1.00@1.25	....
Olean, N. Y.	....	.75	.75	.75	.75	.75
Shining Point, Penn.	....	....	1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Covington and Summit Grove, Ind.	.60@ .85	.60@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Barton, Wis.	....	.60	.80	.80	.80	.80
Chicago, Ill.	1.35‡	1.75‡	1.75‡	1.75‡	1.75‡	1.75†
Columbus, Ohio	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80	....	....	.85
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.	....	.50	....	.80	.70	.70
Hamilton, Ohio	....	1.00	....	....	1.00	....
Hersey, Mich.	....	.50	....	....	....	.70
Indianapolis, Ind.	.60	.60	....	.90	.75@1.00	.75@1.00
Janesville, Wis.	....	.65@ .75	....	....	.65@ .75	....
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.	....	.40	....	....	1.25	....
Milwaukee, Wis.	....	1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.*	.35	.35	1.35	1.25	1.25	1.25
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50	....	1.25	1.25	....
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.55	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.90	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	....	.45	.55	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .60			
Zanesville, Ohio.	.70	.60	.60	.60	.90	.90
SOUTHERN:						
Charleston, W. Va.	1.35	....	....	1.47	1.47	1.47
Chehaw, Ala.	00@ .30	....	.40	.50	....	....
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	....	.50	....	.65	.65	....
New Martinsville, W. Va.	1.00	.90	....	1.30a	....	.90
Roseland, La.	.45	.40	1.75	1.25	1.00	1.00
Smithville, Texas	....	.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	....
Kansas City, Mo.	.80	.70	....	....	....	....
Los Angeles, Calif.	.50	.50	.92	.92	.92	....
Los Angeles District (bunkers)†	.80	1.30	1.30	1.30	1.30	1.30
Pueblo, Colo.	1.10*	.90*	....	1.60*	....	1.50*
San Diego, Calif.	....	.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80	....	.55@ .75	....	....	1.00
Chehaw, Ala.	00@ .30	....	....	....	....	....
Des Moines, Iowa		Washed, .65; unwashed, .40 (not screened)				
Dudley, Ky. (crushed silica)	1.10	1.10	.90	.90	....	....
East Hartford, Conn.			Sand, .75 per cu. yd.			
Elkhart Lake, Wis.	.50	....	....	....	....	....
Gainesville, Texas	....	.95	....	....	....	.55
Grand Rapids, Mich.	....	....	....	.60	....	....
Hamilton, Ohio	....	....	....	....	.70	....
Hersey, Mich.	....	....	....	.55	....	....
Indianapolis, Ind.		Mixed gravel for concrete work, .65				
Lindsay, Texas	....	1.10	....	....	....	.55
Macon, Ga.	....	.35	....	....	....	....
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	....	....	....	....	....	.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00	....	....	....	....
Zanesville, Ohio	....	....	....	....	....	.55

*Cubic yd. †Include freight and bunkerage charges. ‡Delivered on job. (a) ¾ in. down. (b) River run. (c) 2½-in. and less.

Miscellaneous Sands

(Continued from preceding page)

Furnace lining	2.50
Molding fine and coarse	2.00
Traction unwashed and screened	1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Columbus, Ohio:	
Core	.30@ 1.50
Traction	.30@ .90
Molding coarse	1.25@ 1.75
Furnace lining	1.75@ 2.50
Stone sawing	1.25@ 1.50
Brass molding	2.00@ 2.50
Sand blast	3.50@ 4.00
Molding fine	2.00@ 2.25
Eau Claire, Wis.:	
Sand blast	3.00
Traction	.65
Elco, Ill.:	
Ground silica per ton in carloads	22.00@31.00
Elnora, N. Y.:	
Brass molding	1.75@ 2.00
Estill Springs and Sewanee, Tenn:	
Molding fine and core	1.25
Roofing sand, sand blast, traction	1.35@ 1.50
Franklin, Penn.:	
Furnace lining, molding fine and coarse	1.75
Core	2.00
Gray Summit and Klondike, Mo.:	
Stone sawing	1.00
Core, furnace lining, molding fine, roofing sand	1.75
Brass molding	1.75@ 2.00
Sand blast	2.00
Joliet, Ill.:	
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@ .85
Kasota, Minn.:	
Stone sawing	1.00
Mapleton Depot, Penn.:	
Molding fine and coarse, traction	2.00
Massillon, Ohio:	
Core, furnace lining, molding fine and coarse	2.50
Traction	2.00
Michigan City, Ind.:	
Core, in open car, .30; in box car	.40
Mineral Ridge and Ohlton, Ohio:	
Molding fine and coarse, traction, furnace lining, all green	1.60
Core, roofing sand, sand blast, all green	1.75
Montoursville, Penn.:	
Traction	1.10
Core	1.35@ 1.50
New Lexington, Ohio:	
Molding fine	2.00
Molding coarse	1.50
Oceanside, Calif.:	
Roofing sand	3.50
Ottawa, Ill.:	
Core, furnace lining, molding coarse, roofing sand, traction, brass molding	1.25
Molding fine	2.50
Stone sawing	3.00
Sand blast	4.00
Molding coarse (crude silica, not washed or dried)	.75@ 1.00
Red Wing, Minn.:	
Core, furnace lining, stone sawing	1.50
Molding fine and coarse, traction	1.25
Sand blast	3.50
Filter sand	3.75
Ridgway, Penn.:	
Furnace lining, molding fine and coarse	1.50
Core	1.90
Round Top, Md.:	
Core	1.60
Traction	1.75
Roofing sand	2.25
St. Louis, Mo.:	
Core	1.00@ 1.75
Furnace lining	1.50
Molding fine	1.50@ 2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35@2.50	1.35@1.70	1.45@1.80	1.35@1.70	1.35@1.70	1.35@1.70	1.35@1.70
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Emporium and Dubois, Penn.	2.35@2.50	1.35@1.70	1.45@1.80	1.35@1.70	1.35@1.70	1.35@1.70	1.35@1.70
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45		1.45		1.45†	1.45‡
Jackson, Ohio		1.05		1.30	1.05		1.30‡
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55		1.55‡
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

*¼ in. to 1½ in. †¼ in. to 2 in. ‡1½ in. to 3 in.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00				
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00					2.25t
Williamsport, Penn.			10.00				6.00	
York, Penn.		10.50	10.50	11.50			8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)	12.50	10.00	10.00		9.00	11.00	9.00	
Delaware, Ohio	12.50	10.00	9.00	10.50	10.00	15.00	9.00	1.50
Gibsonburg, Ohio (f)	12.50	10.00	10.00		9.00	11.00	9.00	
Huntington, Ind.	12.50@14.50	10.00	9.00				9.00	
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		10.00	9.00	10.00v			9.00	1.50c
Marion, Ohio		10.00	9.00				9.00	1.50c
Sheboygan, Wis.							9.50	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00	9.00	
Woodville, Ohio (f)	12.50	10.00	9.00		9.00	10.50l	9.00	1.50
SOUTHERN:								
El Paso, Texas							10.00	1.75
Graystone, Ala.	12.50	11.00		10.00		1.35u	8.50	1.50
Karo, Va.		10.00	9.00				7.00g	1.65h
Knoxville, Tenn.	20.50	11.00				1.35	8.00	1.50
Ocala and Zuber, Fla.	13.00	12.00	10.00			1.50	12.00	1.70
Varnons, Ala. (f)		10.00p	10.00p				8.00q	1.40r
WESTERN:								
Kirtland, N. M.							15.00	
San Francisco, Calif.	20.00†	20.00†	15.00s	20.00†				2.50o

†50-lb. paper bags, burlap 24.00; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. bbl.; 2.65, 280-lb. bbl.; (l) 80-lb. paper; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering, 3.00 finishing; (u) two 90-lb. bags; (v) bulk.

Miscellaneous Sands

(Continued)

Molding coarse	1.25@ 1.75
Roofing sand	1.75
Sand blast	3.50@ 4.50
Stone sawing	1.25@ 2.25
Traction	1.25
Brass molding	2.00@ 3.00
San Francisco, Calif:	
(Washed and dried) — Core, sand blast and brass molding	3.50@ 5.00
Furnace lining and roofing sand	3 50@ 4.50
Molding fine and traction	3.50
Molding coarse	4.50
(Direct from pit)—Core and molding fine	2.50@ 4.50
Sewanee, Tenn.:	
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding	1.25
Skerkston, Ont.:	
Traction (lake sand)	.65
Tamms, Ill.:	
Ground silica per ton in carloads	20.00@31.00
Thayers, Penn.:	
Core	2.00
Molding fine and coarse	1.25
Traction	2.25
Utica, Ill.:	
Core, furnace lining, molding fine (crude and dry)	.60@ 1.00
Molding coarse (crude and dry)	.60@ 1.25
Traction, roofing sand	1.00
Brass molding	1.00@ 1.25
Stone sawing	1.00@ 2.75
Sand blast	2.75
Molding fine	.60
Molding coarse	.65@ .70
Core and furnace lining	.75
Utica, Penn.:	
Core	2.00
Molding fine and coarse	1.75
Warwick, Ohio.:	
Core, molding fine and coarse (green)	1.75
Core, molding fine (dry)	2.25
Zanesville, Ohio:	
Molding coarse	1.50
Core, furnace lining, molding fine, brass molding	2.00
Traction	2.50
Molding coarse	1.40@ 1.50
Molding fine, brass molding	1.50@ 1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel workers' crayons, per gross	1.25
Chatsworth, Ga.:	
Crude	4.50
Ground (20-70 mesh), bags	8.00@10.00
Ground (150-200 mesh), bags	8.00@10.00
Pencils and steel workers' crayons, per gross	1.50
Chester, Vt.:	
Ground (150-200 mesh), bags	9.00@15.00
Bags	10.00@11.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Emeryville, N. Y.:	
(Double air floated) including bags; 325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground (150-200 mesh), bags	9.00@15.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72%	4.25@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.50@6.00
B.P.L. 75%	6.00
B.P.L. 75% (free of fines for furnace use)	6.50@ 6.75
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.	5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@ 8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12, 24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10, 18x10, 18x9, 18x12	12.60	11.00	8.70	8.75
16x10, 16x9, 16x8, 16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x8	11.10	10.50	8.10	7.80
14x7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	14.00@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	——
Denver, Colo.	24.00	——
Detroit, Mich.	15.50	15.50
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.	....	18.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	....	21.00
New Orleans, La.	24.00	16.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	23.00	19.00
San Francisco, Calif.	....	22.00
Seattle, Wash. (paper sacks)	24.00	——

(Continued from preceding page)

Ground Rock
(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@	5.00
Mt. Pleasant, Tenn.—B.P.L. 65%		7.00
13% phosphorus, 95% thru 80 mesh		5.75
Twomey, Tenn.—B.P.L., 65%	7.00@	8.00

Florida Phosphate
(Raw Land Pebble)
Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00@16.50
No. 2 lump, per net ton	17.00@17.50
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	18.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt.‡—English cream and pink	9.00	9.00
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries	....	17.50
Crown Point, N. Y.—Mica Spar	....	8.00@10.00
Easton, Penn., and Phillipsburg, N. J.—Green granite	12.00@16.00	12.00@16.00
Haddam, Conn.—Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags	†12.50	†12.50
Ingomar, Ohio (in bags)	....	12.00@20.00
Middlebrook, Mo.—Red	....	20.00@25.00
Middlebury, Vt.‡—Middlebury white	9.00	9.00
Milwaukee, Wis.	....	14.00@34.00
Newark, N. J.—Roofing granules	....	7.50
New York, N. Y.—Red and yellow Verona	....	32.00
Red Granite, Wis.	....	7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal.—"Natrock" roofing grits	....	*12.00
Tuckahoe, N. Y.	....	12.00
Villa Grove, Colo.	....	13.00
Wauwatosa, Wis.	....	16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C. L., 15.50.

‡C.L.; less than C.L., 12.50. These prices for orders placed before July 15 for del. before Sept. 15. After July 15 price C.L. will become 11.00 and L.C.L. 14.00 per net ton, including bags.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	19.00	25.00@55.00
Prairie du Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	18.00@21.00	35.00@37.50
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Farmington, Conn.	14.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Syracuse, N. Y.	*18.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla.—White	13.00
Buff	17.00

*Mill price, 20.00 delivered.

Gray Klinker Brick

El Paso, Texas	13.00

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Boston, Mass.	....	2.63
Buffalo, N. Y.	....	2.48
Cedar Rapids, Iowa	....	2.44
Cincinnati, Ohio	....	2.47
Cleveland, Ohio	....	2.39
Chicago, Ill.	....	2.20
Columbus, Ohio	....	2.44
Dallas, Texas	.48¾	1.95
Davenport, Iowa	....	2.39
Dayton, Ohio	....	2.48
Denver, Colo.	.63¼	2.55
Detroit, Mich.	....	2.25
Duluth, Minn.	....	2.19
Indianapolis, Ind.	....	2.41
Kansas City, Mo.	54¼	2.17
Los Angeles, Cal. (less 5c dis.)	.60	2.60
Louisville, Ky.	....	2.45
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.	....	2.25
Minneapolis, Minn.	.60½	2.42
Montreal, Que.	....	1.90
New York, N. Y.	....	2.25
Omaha, Neb.	.62¾	2.51
Philadelphia, Penn.	....	2.41
Pittsburgh, Penn.	....	2.19
San Francisco, Calif.	.65¼	2.31
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	....	2.42
Seattle, Wash. (10c bbl. dis.)	....	2.95
Toledo, Ohio	....	2.40

NOTE—Add 40c per bbl. for bags.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	....	1.95
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.05
Hannibal, Mo.	....	2.05
Hudson, N. Y.	....	2.05
Leeds, Ala.	....	1.95
Mildred, Kan.	....	1.95
Nazareth, Penn.	....	1.95
Northampton, Penn.	....	1.95

*Including sacks at 10c each.

Cement Products

Hawthorne tile, carload lots, f.o.b. Cicero, Ill.

	Per sq.
Silver gray	....
Red French	9.50
Green French	11.50
Red Spanish	12.00
Green Spanish	12.00

	—Cicero— Red	Green
Ridges	.25	.35
Hips	.20	.30
Ridge closers	.05	.06
Hip terminals, 3 way	1.25	1.50
Hip starters	.50	.60
Gable finials	1.25	1.50
Gable starters	.20	.30
End bands	.20	.30
Eave closers	.06	.08

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	3.00	8.00	15.00	7.00	9.00	9.00	9.00	....	25.80	11.00	....	....	....
Douglas, Ariz.	....	....	7.00	....	16.50	....	19.50	....	....	15.50	....	....	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	26.55	20.00	....	....	....
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	18.00	7.00	27.15	17.00	....	20.00	30.00
Hanover, Mont.	....	....	....	11.80	....	....	....	....	....	....	....	....	....
Los Angeles, Calif.	....	....	....	10.90b	....	....	12.30	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	....	....	16.40	....	17.40	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	18.00a	....	....	....	....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	....	....	....	——	28.50	....	34.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).

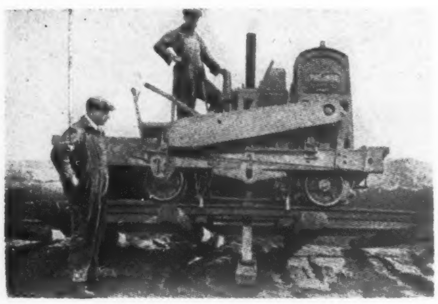
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) sacks, 12c each.

New Machinery and Equipment

Machine for Shifting and Raising Track

THE tendency to use machinery to take the place of hand labor in rock products plants is well illustrated in the device illustrated herewith—a machine for shifting track behind steam shovels, in quarries, and on waste dumps wherever it is necessary to dispose of much material. The machine is unique due to the fact that it removes the last laborious and expensive labor operation in such work. It has already been adopted by some experienced quarry operators.

This machine is used for shifting track and for raising track and it will, it is claimed, accomplish the results of a gang



Machine for shifting track

of 15 or 20 men and do it about four times as fast. It will reduce the track gang to five or six men and eliminate the use of track jacks and bars. These five or six men will be required for tamping and blocking up the track after it is shifted. The machine will also be used as a jack for leveling the track after it is shifted.

The machine is powered by a 40-h.p. gasoline engine and is self-propelled. It will travel at 25 miles an hour and can be used for hauling men and tools to the job, as well as for track shifting and track raising.

The machine is claimed to be easily operated. The manufacturer states: "We know of one instance where a 'green' operator, the first time he handled the machine, shifted 200 ft. of track 6 to 8 ft. in 25 minutes. On track raising we have an instance where 1200 ft. of track was raised 18 in. three times in a shift, or 3600 ft. in all. The operator claimed that a mile of track could be raised this amount in eight hours." The machine has a lifting power of approximately 50,000 lb. It is said to lift firmly embedded track and frozen in track that cannot be budged with ordinary track jacks, and after the track is thrown the machine is very handy for picking up low spots and taking slight kinks out of the

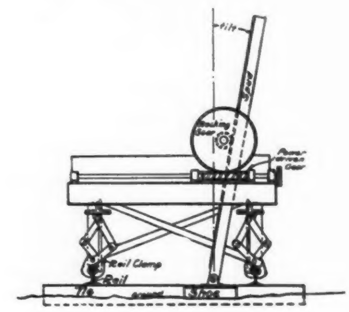


Fig. 1. First step

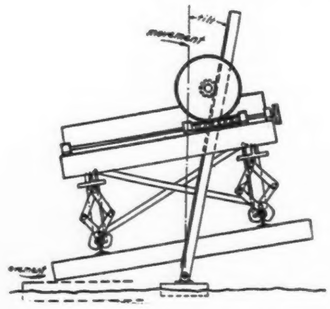


Fig. 2. Second step

rail during aligning, thus doing away with all hand jacks.

In operating, the machine is clamped to the rails, which is accomplished by shifting a convenient lever. Then the central spud or rack with a broad foot piece on the bottom is forced down until it rests upon the ground between the ties and tilted at a slight angle from the vertical. Then the machine is racked up on this spud and lifts the rail and ties with it. As the track is lifted higher, more track is raised from the ground, which finally reaches a point where the load overcomes the friction and the spud topples over carrying the machine and track to a new position. The spud is then raised, the clamps loosened and the machine moves 40 or 50 ft. and repeats the operation, and in all about 36 in. are accomplished each time. A second trip over the track will result in a total movement of 5 to 8 ft. which is generally sufficient on waste dumps.

For track raising the spud is operated vertically in the exact center of the machine, which lifts the track straight up for blocking and tamping.

This machine is built under the Ernest E. Peterson patents, the exclusive license for

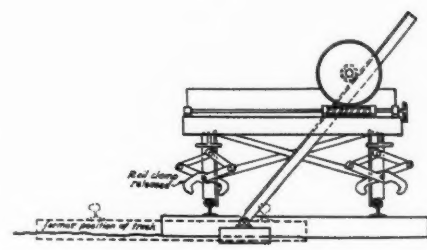
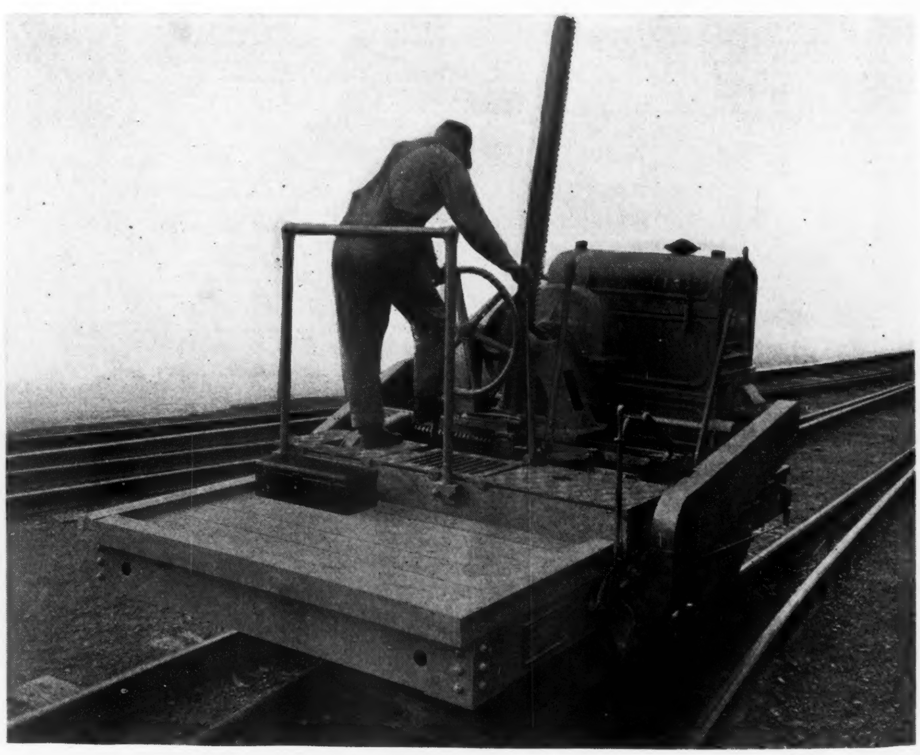


Fig. 3. Track shifted



Track-shifting machine illustrating operator's controls

which is now in the hands of the Nordberg Manufacturing Co., Milwaukee, Wis., one of the leading builders of well-known mining and power machinery.

New Type Revolving Shovel

LATE in the year 1924, the Marion Steam Shovel Co. began to build a shovel which was designed to fill a long-felt need. A number have already been built and are doing their work in coal stripping, general contracting and open-pit mining, such as stone quarries, iron ore and coal pits.

This new shovel, the Model 125, is full revolving, has large dipper capacity, is mounted on crawling traction trucks, and is designed throughout for the hardest work and toughest digging.

The design and construction are such that the main upper frame which carries all the machinery, including the boiler, piping and cap, can be shipped as a unit on railroad trucks. Because of this, a minimum amount of erection is necessary in the field.

The machine is mounted by three-point suspension on four crawling traction trucks and equalizing is accomplished by means of a pivoted cast alloy steel axle. In traveling over uneven ground the front trucks with their axle are free to adjust themselves in a vertical plane without a tendency to create stresses or strains in the frame, or cause a steering movement. This is made possible by a simple device on which patents are pending, and which allows the axle to move only in a vertical plane, always parallel to the rear axle. In the crawler trucks, alloy cast steel frames with the same general construction as those used on the railroad crawler trucks with 36-in. links are used.

The low frame is constructed of 30-in. I-beams which are the deepest that are being manufactured today. The two side beams project at the corners to accomodate the jack castings and rear crawler bearing castings. The top of the frame is covered with heavy 1-in. gusset plates. The lower circle is made up of 80-lb. rails and is 16 ft. in diameter. There are 36 alloy steel rollers used and each is bushed and individually lubricated.

Propelling is accomplished entirely through gears to all four of the crawler trucks. Any one of the trucks can be disconnected by a clutch which makes steering very easy and the turning radius very small.

All beams are 24-in. and are entirely covered with heavy deck plates. An extra heavy center casting is rigidly bolted to the front frame girders. A cast-steel separator casting is located in the front and contains all the bearings for the rotating gears. Steel corner castings give added strength to the front cross girder which is bolted in its entire length to the longitudinal beams.

The boiler is a locomotive type with a fire brick arch as standard equipment. This arch is not only designed as a fuel economizer but also to eliminate tube troubles by preventing cold air from reaching the tubes while firing. The boiler is so located lengthwise on the machine as to facilitate cleaning and replacing tubes.

The hoisting engines are horizontal with single gear reduction to hoisting drum. They have especially large and balanced inside admission piston valves. These valves are actuated by means of the Marshall valve gear which carries only one eccentric and no sliding parts. All pin connections in this valve gear have case hardened pins and have hard bronze bushings.

The electric shovel is equipped with two motor generator sets driven by synchronous and induction motors, individual generators being supplied for the hoisting, swinging and crowding operations. Various motor speeds are obtained by the Marion Ward-Leonard control operated by controllers at the operator's station. Marion modified shunt motors made by the General Electric Co. are standard on the hoist, swing and crowd. An electric trip motor is also standard on the electric shovels.

The hoist motor is connected to the hoist drum by means of a flexible coupling and a double reduction of herringbone gears. The first pinion shaft, intermediate shaft and hoist drum shaft are carried in renewable babbited bearing shells of such proportions as to cut the maximum bearing pressures to standard mine hoist practice.

These main bearings are equipped with the flooded oil lubrication system similar in design to that of an automobile engine and consisting of a motor-driven oil circulating pump, sump tank, conductor and drainage piping. A system such as this assures a continuous and copious flood of oil to each bearing—the first power shovel to be equipped with a pressure oiling system.

The boom is of all-steel construction consisting of two main members in the form of plate girders which are well trussed, braced and connected to each other by means of bulk heads, top and bottom plates. The foot casting is very large and wide and is stepped into a socket casting of similar design. The sheaves to the point of the boom and sheave block on the dipper are 36 in. in diameter.

As a dragline with an 80-ft. boom, the Model 125 has ample distance and a small angle of lead with the drag drum and fairlead insures minimum wear on cable and bearings. The shovel can be very easily converted into a dragline by changing the booms and adding the drag drum.

Waste Heat Recovery at Hawkeye Cement Plant

THE Edge Moor Iron Co., Edge Moor, Del., has prepared a booklet describing the waste heat installation at the plant of the Hawkeye Portland Cement Co., located near Des Moines, Iowa. It gives a description of the plant and manufacturing process along with a number of illustrations.

The Hawkeye plant uses the wet process and has six 8x125 ft. kilns. Prior to the installation of waste heat equipment, new burners and other improvements, the plant had a productive capacity of 3600 bbl. which was increased by these improvements to 4500 bbl, with the same kilns and without increasing the amount of coal burned per barrel of clinker produced.

A new large full-revolving steam shovel

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 6:

Central Freight Association Docket

11015. Crushed stone, also sand (other than blast, core engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel. Kenneth and Lake Ciecott, Ind., to Indianapolis, Ind. Present rate, $1.01 per net ton; proposed, 95c per net ton.

11016. Crushed stone, also sand (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel. Kenneth and Lake Ciecott, Ind., to Wakarusa, Ind., (Wabash Ry. delivery). Present rate, $1.17 per net ton; proposed, $1.01 per net ton.

11017. Crushed stone. White Sulphur, Ohio, to Somerset, Junction City, Shawnee and Oak Hill, Ohio. Present rate, sixth class; proposed, 90c to Somerset and Junction City, Ohio; $1.00 to Shawnee, Ohio, and $1.30 per net ton to Oak Hill, Ohio.

11018. Crushed stone, also sand (other than blast, core, engine, filter, fire, furnace, foundry, glass, grinding or polishing, loam, moulding or silica sand) and gravel. Kenneth and Lake Ciecott, Ind., to North Liberty, Ind. (N. Y. C. R. R. delivery). Present rate, $1.27 per net ton; proposed, $1.01 per net ton.

11019. Limestone, crushed or ground or pulverized, other than in barrels, boxes or sacks. Piqua, Ohio, to Green Bay, Wis. Present rate, $3.65 per net ton; proposed, 19½c routing via B. & O. R. R. (West) Toledo, P. P. M. Ry., Kewaunee, Wis., and K. G. B. & W. Ry.

11020. Sand (other than blast, core, engine, filter, fire, furnace, foundry, glass, grinding or polishing loam, moulding or silica) and gravel. Freedom, Ind., to Jasonville, Ind. Present rate, 13c; proposed, 90c per net ton.

11025. Crushed stone. Blanchard, Ohio, to Cincinnati, Ohio. Present rate, 18c; proposed, $1.00 per net ton.

11044. Crushed stone. McCook and Thornton quarries on the B. & O. C. T. R. R., to Albion, Ind. Present rate, $1.38 per net ton; proposed, $1.13 per net ton.

Western Trunk Line Docket

4646. Gravel. Carloads, from Jedburg and Pacific, Mo., to New Orleans, La. Present—Combination rate of $10.71 per ton of 2000 lb. using 61c per ton to St. Louis as per Mo. Pac. Tariff 1221 G. I. C. C. A5769 and 50½ cents per 100 lb. beyond as per F. L. Spelden's Tariff 130 B, I. C. C. 803 Class "A." Proposed—$4.30 per ton of 2000 lb. Min. wt. 90% of marked capacity of car, but not less than 60,000 lb. except when cars are loaded to full visible or space carrying capacity in which case actual weight will govern.

3545. Sand. Carloads, from Holliday and Zarah, Kan., to Swope Park, Mo. Present rate, combination on Kansas City; proposed, 4c. Minimum weight 90% of marked capacity of car, except when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply. In no case shall the minimum weight be less than 40,000 lb.

4671. Sand and gravel, straight or mixed. Carloads, from Iola, Kan., to Kansas City, Mo.-Kan. Present—Class E, 11½c; proposed, 6½c per 100 lb. Minimum weight 90% of marked capacity of car except that when actual weight of shipment loaded to full visible capacity of car, the actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb.

Southern Freight Association Docket

21191. Sand. Carloads, minimum weight stenciled capacity of car, except in the absence of weighing facilities at shipping point, freight is weighed in transit or at destination, the carload minimum weight will be 90% of stenciled capacity of car, and except further, where cars are loaded to their visible capacity, actual weight will govern from Estill Springs and Sewanee, Tenn., to Bells and Britain, Tenn. Proposed, $1.76 per net ton based on the proposed Georgia joint line scale.

21193. Limestone. It is proposed to cancel the commodity rate of $2.82 per ton, 2000 lb., on calcite, ground (ground limestone), carloads, as published in Agent Glenn's Northbound Commodity Tariff No. 10 I. C. C. A498, from Cartersville, Ga., to Nashville, Tenn., allowing the mileage scale rate of $1.24 per net ton as published in N. C. & St. L. Ry. I. C. C. 2933A to apply.

21343. Stone. It is proposed to establish rates somewhat higher than proposed Georgia scale, less 10% on stone, broken, crushed, rubble and ballast, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern from Mascot, Tenn., to L. & N. R. R., Knoxville & Cumberland Valley Division stations. Statement showing present and proposed rates will be furnished on request.

Illinois Freight Association Docket

1788. Sand and gravel. Carloads, minimum weight marked capacity of car from Chillicothe, Ill., to Keokuk, Iowa. Present—None; proposed, $1.35.

2295. Stone, crushed. Carloads, minimum weight 90% of marked capacity of car, but not less than 40,000 lb. except when for carrier's convenience a car of less capacity is furnished in which event the marked capacity of car, but not less than actual weight will apply, from Chicago, Ill., to Rock Island, Ill., Davenport, Ia., stations on the R. I. S. Ry., Muscatine, Fruitland, Columbus Junction and Morning Sun, Iowa, and stations taking same rates in C. R. I. & P. Ry. Tariff 31324 Series. Present—8c per 100 lb. (Subject to Tariff 228); proposed, $1.45 per net ton (not subject to Tariff 228). Applicable on traffic originating in Southeastern and Carolina territories.

2324. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, actual weight will apply from Moronts, Ill., to McNabb, Ill. (rates in cents per net ton). Present, 63; proposed, 50.

3247. Stone. Carloads. Proposed to increase the minimum weight on crushed stone, carloads, between points in Illinois Rate Committee territory to 90% of the marked capacity of the car, except that when cars are loaded to full cubical or visible capacity actual weight will apply, but not less than 60,000 lb.

New England Freight Association Docket

8417. Sand. Minimum weight 90% of marked capacity of car. Provincetown, Mass., to Reading, Penn., 19½c. Reason—To enable a rail movement of this traffic.

8444. Limestone, crushed and limestone chips or waste. Minimum weight 40,000 lb., from Brandon, Cavendish, Leicester Junction, Middleburg and New Haven Junction., Vt., to points on the N. Y. C. R. R. and W. S. R. R. 13 to 23½c, the same as now published to points of destination in Rutland R. R. I. C. C. 5724. Reason—To provide equitable rates for movement of crushed limestone.

8460. Limestone, crude, crushed or ground. Minimum weight 40,000 lb., from Brandon and Middlebury, Vt., to Camden, Elizabeth, N. J., Harrisburg, Lancaster, Lansdowne, Penn., Newark, N. J., Reading, Penn., Trenton, N. J., Wilmington, Del., York, Penn., 22 cents via Rutland-D. & H. Penn. R. R. Reason—Comparable with other rates at present in effect from Rutland R. R. stations to points of similar distances.

8481. Stone, broken or crushed. In bulk in gondola or other open top cars, minimum weight 90% of marked capacity of car, except when cars are loaded to cubical or visible capacity, actual weight will apply from Danbury, Conn. (Stearns Lime Co. Siding) to Hawleyville and Bridgeport, Conn., 70 cents; Monroe and New Haven, Conn., 80 cents; So. Norfolk, Westport, Saugatuck and Harlem River, N. Y., 85 cents per ton of 2000 lb. Reason—Equalization of competitive conditions.

Southwestern Freight Bureau Docket

5164. Sand. From Guion, Ark., to points in Texas. To establish a rate of 13½ cents per 100 lb. on sand, carloads, minimum weight 80,000 lb. or marked capacity of car if less than 80,000 lb., from Guion, Ark., to Dallas, Ft. Worth and Corsicana, Texas. Shipper states that the present class basis is prohibitive and will not enable them to move the traffic.

5168. Stone. From St. Louis, Mo., to points in Missouri. To establish rates on asphalt coated crushed stone and asphalt coated chatts, carloads, minimum weight marked capacity of car, except when to full visible carrying capacity, actual weight will govern, from St. Louis, Mo., to points in Missouri on the St. Louis, San Francisco Ry., and short line connections, based 10 cents per net ton higher than present rates on crushed stone, sand, gravel, etc. It is stated that the plant located at St. Louis is in direct competition with the plant located at Webb City, from which point the scale herein proposed has already been established.

5226. Sand. From Sand Springs and Tulsa, Okla., to Columbus, Kan. To establish a rate of 7 cents per 100 lb. on sand, carloads, minimum weight marked capacity of car from Sand Springs and Tulsa, Okla., to Columbus, Kan. It is stated that the proposed rate is now in effect to Galena, Kan., and as Columbus, Kan., is directly intermediate that the same rate should be established to Columbus.

Trunk Line Association Docket

M551. Rates on sand and gravel, carloads, minimum weight 90% of marked capacity of car from Fenstermachers and Germans, Penn., to stations on the Reading R. R., rates ranging from $1.15 to $1.95 per net ton on sand (other than blast, engine, foundry, glass, moulding and silica) and gravel and $1.30 to $2.20 on sand, blast, engine, foundry, glass, moulding and silica. This proposal involves a few minor advances.

Sand Increases Forbidden

A FINDING of non-justification has been made in I. and S. No. 2328, sand, in carloads, from Eau Claire, Wis., to destinations in Michigan, mimeographed, as to proposed increased rates on sand, from Eau Claire to Detroit. The proposal was to increase the rate from $3.49 to $3.74 per ton so as to equal the highest intermediate rate.

The Chippewa Valley Traffic Bureau protested the proposal and had it suspended. On January 28, 1924, the protestant asked that the rate of $3.49 be specifically published at points in Michigan, in accordance with rule 77. The rate of $3.74 was published at three of the intermediate points. The Soo line, according to the report, instructed the publishing agent to comply with rule 77, which, of course, meant publishing the rate. The Soo witness testified, said the report, that lines in central territory asked the agent to withhold publication pending a revision of the rate to Detroit. On that point the commission said:

> Publication was accordingly withheld with the result that the respondents participating in this $3.74 rate defaulted in their obligation under rule 77 for over a year, notwithstanding requests from shippers. Effective February 1, 1925, a rate of $3.36 was published to Grand Rapids. Effective February 10, 1925, the rate of $3.49 was established to Ionia, Owosso and Cadillac, and effective April 1, 1925, to Saginaw and Ecorse. Meantime on December 19, 1924, the suspended schedules were filed by the publishing agent on behalf of respondents thus in default proposing to increase the rate to the more distant point instead of fulfilling their existing tariff obligation under rule 77. The participating carriers in central territory by authorizing the use of rule 77 had authorized the publishing agent to establish the rate to intermediate points. He had no need to com-

municate with them before doing so and no excuse is given for the action of those carriers in asking him to delay publication and, finally, to remove the obligation altogether. If rule 77 is to continue available to carriers it must be scrupulously observed. This phase of the matter will receive appropriate consideration but will not be further discussed in this report. . . .

No justification of the increase has been offered, except a contention of the eastern carriers that the division of $1.89 is unsatisfactory to them. The western carriers are satisfied with the present rate and the divisions thereof. The eastern carriers say that, from some unnamed points, rates have been constructed by adding $2.14 for the eastern carriers to the local of $1.60 to the junction. The $2.14 was at one time published as a proportional.—*Traffic World.*

Alabama Aggregate Rates Investigated

IN its May report the Birmingham Traffic Association stated that the Alabama public service commission had instituted a general investigation into rates within the state on sand, gravel, clay, shale, slag, chert and crushed stone. The case is set for hearing July 8.

Dewey and Oklahoma Cement Companies Win Rate Refund Cases

PORTLAND cement companies won two rate refund cases in decisions handed down by the Supreme Court recently.

The court sustained the reasonableness of the corporation commission ruling which granted the Dewey Portland Cement Co., of Dewey, Okla., its application for $9,428 in rebates from the Katy, Santa Fe and Frisco railroads. The rebate was the difference between alleged discriminatory rates of government control days and the rate which the commission fixed on slack coal from Oklahoma mines to Dewey.

The time, however, was during the six months guarantee period after the return to private control, during which no rate decreases were to go into effect without approval of the interstate commerce commission. For this reason the court directed that the commission order be modified not to go into effect until approved by the interstate commission.

In the other case the court sustained the corporation commission's jurisdiction in an award of $45,353.26 made to the Oklahoma Portland Cement Co., of Ada, Okla., against the Frisco R. R., for alleged overcharges on shipments of crushed limestone from the company's quarry, five and a half miles to its mill in Ada. The order, however, was remanded to the commission for correction. —*Oklahoma City Oklahoman.*

Cement Into New England

A BASIS for making rates on portland cement from Hudson, N. Y., into New England has been proposed by Examiner John T. Money in No. 15516, Atlas Portland Cement Co. vs. Bangor & Aroostook et al. The basis is a mileage scale beginning with distances of thirty miles, because hauls for shorter distances would be intrastate, and running up to 635 miles and greater. Money said the Commission should find the existing rates unjust and unreasonable.

The complaint, as amended, the examiner said, alleged the rates from Hudson to points on the lines of the defendants, in New England, and in New York east of the Hudson river, were unreasonable. The destination territory, Money said, included all points on the Boston & Albany, Boston & Maine, the New York, New Haven & Hartford, Maine Central, Central New England, and on the Grand Trunk lines of New England, including Atlantic & St. Lawrence, Canadian National, Champlain & St. Lawrence, United States and Canada, named in Boston & Albany I. C. C. Nos. 8707, 8749, 8751 and 8783, and all stations on the Bangor & Aroostook. The New York Central, Rutland, and Central Vermont, the examiner said, were not parties to the case.

Cement manufacturers in Pennsylvania and New Jersey and railroads serving them and manufacturers in the Hudson district also intervened, in opposition to the complaint. Complainant contended, the examiner said, that the rates from Hudson to all points on the lines of the defendants, except the Bangor & Aroostook, were unreasonable to the extent they exceeded rates based on the scale of distance rates prescribed in Allentown Portland Cement Co. vs. Baltimore & Ohio, 49 I. C. C. 420, from Troy, N. Y., to all points on the Boston & Maine, as revised since its prescription.

PROPOSED BASIS FOR RATES

	Rates in cents per 100 pounds[1] Scale A	Scale B
[2]50 miles and over 30....	9.5	10.5
70 miles and over 50....	10.5	11.5
90 miles and over 70....	11.5	12.5
110 miles and over 90....	12	13
130 miles and over 110....	12.5	14
150 miles and over 130....	13	14.5
170 miles and over 150....	13.5	15
190 miles and over 170....	14	16
210 miles and over 190....	14.5	16.5
235 miles and over 210....	15.5	17.5
260 miles and over 235....	16.5	18
285 miles and over 260....	17	18.5
310 miles and over 285....	17.5	19.5
335 miles and over 310....	18	20
360 miles and over 335....	18.5	21
385 miles and over 360....	19.5	22
410 miles and over 385....	20.5	23
435 miles and over 410....	21	24
460 miles and over 435....	21.5	25
485 miles and over 460....	22	26
510 miles and over 485....	23	27
535 miles and over 510....	24	28
560 miles and over 535....	25	29
585 miles and over 560....	26	30
610 miles and over 585....	27	31
635 miles and over 610....	28	32
Over 635 miles..................	29	33

[1]For application in connection with a carload minimum weight of 50,000 pounds, subject to marked capacity of car, but not less than 40,000 pounds.

[2]Hauls for shorter distances are intrastate.

Scale A is for application to points on all lines of defendants except Bangor and Arostook, and such portions of the Main Central as are east thereof and Scale B for application to all points on the Bangor and Aroostook and Maine Central east of the Bangor and Aroostook.

—*Traffic World.*

The Missouri Road Industry

WITH the State Highway Commission embarked on a program of 1000 miles of road construction in 1925, employing upwards to 20,000 men and a large amount of materials, Missouri has stepped into the front rank of road building states and road construction has become one of the big industries of the state.

The program is composed of approximately 500 projects, scattered in 114 counties, all going forward under supervision of the State Highway Commission which, in addition, must look to the maintenance of the 7640 miles of improved and unimproved roads in the state system.

Some of the materials to be used this year are:

	Tons
Gravel	1,321,580
Crushed Stone	1,157,300
Sand	779,049
Cement	369,045

Much of the crushed stone and sand is furnished by the commission, which saved the state more than $200,000 by purchase of cement last winter when it was 10 cents a barrel below the present market price.

Developments of Sand-Lime Brick Research

NEW developments may be expected soon in the sand-lime brick industry. A number of leading manufacturers having jointly started scientific investigations of sand-lime bricks and their composition at the Massachusetts Institute of Technology at Boston. A complete analysis of the sand-lime brick manufacturing process will be made to attempt to determine the full possibilities of the material.

"Sand-lime brick, which have satisfactorily passed the tests of the government bureau of standards, are steadily getting into prominence in the building industry," says Otto Schwartz, president of the American Brick Co., "The north seems to be leading in the use of the product. Milwaukee and Dayton use sand-lime brick extensively.

The Everstone sand-lime brick, which is manufactured in New Orleans by the American Brick Co., has been employed in the following outstanding city buildings: The Cloverland Dairy, Waldo Burton Memorial, the new Tulane University science building, the Woodward-Wight warehouse, the Napoleon Avenue Methodist chuch, the La Salle Hotel and the Lighthouse for the Blind.—*New Orleans (La.) Times.*

Dexter Cement to Increase Capital

THE stockholders of the Dexter Portland Cement Co., Nazareth, Penn., will vote July 14 on increasing the authorized capital stock from $2,000,000 to $5,000,000. The Dexter company has 10 short (100 ft.) kilns with waste-heat boilers and employs the dry process of manufacture.

News of All the Industry

Incorporations

Acme Crusher and Rock Co., Kansas City, Kan.

Elizabeth Feldspar Mines, Ltd., Toronto, Ont., $50,000.

Bartonville Rock Stone, Ltd., Hamilton, Ont., $40,000.

Tampa Rock Co., Tampa, Fla., $50,000; D. M. Wilcox, Hillsboro Hotel.

Flat Rock Mica Co., Penland, N. C., $10,000; W. F. Deneen and H. Bailey.

Anchord Sand and Gravel Co., Dayton, Ohio, $5,000; R. D. Houston.

Concrete Material Co., Lankershim, Calif., H. W. Jones and F. M. McAvoy.

National Feldspar Co., Ltd., Toronto, Ont., $40,000; M. Lancaster and others.

Sarnia Gravel Co., Ltd., Sarnia, Ont., $40,000; granted provincial charter.

Gypsum Cement Block, Ltd., Ottawa, Ont., $100,000, granted federal charter.

Traham and Co., Montreal, Que., registered to manufacture artificial stone.

Fair River Gravel Co., Brookhaven, Miss., $20,000; Eugene McCormick and P. Z. Jones.

Camden Gravel Co., Benton county, Tenn., $20,000; F. E. Hatfield and John W. Loch.

Couture and Frere, Montreal, Que., manufacturers of concrete blocks, have been dissolved.

New England Lime Co., Wilmington, Del., $5,500,000. (Delaware Registration Trust Co.)

Muskogee Sand and Gravel Co., Muskogee, Okla., capital increased from $50,000 to $100,000.

Dixie Portland Cement Co., Chattanooga, Tenn., capital stock increased from $3,100,000 to $3,600,000.

Hillsdale Gravel Co., Sweetwater, Texas, $10,000; Marvin Hood, T. Vard, and J. M. Stevenson.

Northeast Concrete Products Co., Philadelphia, Penn., $1,150,000. (United States Corporation Co.)

Gem Rock Products Co., Los Angeles, Calif., $250,000; T. F. Howard, James and Adolph Leicht.

Baker Sand Co., LaPorte, Ind., $15,000; William H. Baker, Earl L. Spraker and Suzanna U. Kelley.

Universal Concrete Products Co., Detroit, Mich., has changed its name to the Universal Tile and Supply Co.

Harston Sand and Gravel Co., Dallas, Texas, changed name to Dallas Washed and Screened Gravel Co.

Gravel Production Co., Fort Worth, Texas, $30,000; H. F. Owsley and H. P. Bonner, 1905 Hemphi street.

Black Rock Concrete Products Co., Pocatello, Idaho, $25,000; G. L. and Godfrey Gregerson and Helen Christensen.

Superior Stone, Ltd., Kitchener, Ont., $40,000; W. E. Mitchell and others. Will manufacture and deal in artificial stone.

Liberty Lake Gravel Co., Chicago, changed name to North Shore Material Co. and increased capital from $300,000 to $1,000,000.

Bethany Crushed Stone Co., Bethany, Mo., $30,000; Mrs. Abbie Rand, H. J. Rand, D. F. Perkins, W. W. and C. W. Myers.

Memphis Cement Material Co., Memphis, Tenn., $10,000; A. G. Hopton, C. B. Pace, E. Hopton, Clifford B. Pace and A. H. Custer.

Colgan Limestone Products Co., Columbus, Ohio, $500; F. J. Colgan, C. R. Monsarrat, J. A. Colgan, S. N. Ballock and C. A. Shirey.

Duntile and Cement Products Co., Inc., Baltimore, Md., with headquarters at 1820 Eastern avenue, by Stephen Snialkowski and others.

Ousterhoudt Sand and Gravel Co., Olean, N. Y., $20,000; W. O. Ousterhoudt, J. S. Mallery, and C. E. Myers. (Attorney, H. A. Cobb, Olean.)

Bee Ridge Cement Works, Sarasota, Fla., $25,000; B. A. Lamont and J. F. Pratt; has plant at Bee Ridge, Fla., for manufacturing cement products.

Angle Concrete Mold Co., Newark, N. J., $300,000; William C. Kendall, Albert C. Marsh and William H. Dennys. (Attorney, William F. Smith, New York.)

Southern Concrete Products Corporation, Miami, Fla., $40,000; Charles W. Hayes, president; Clarence Ford, vice-president; Amil Logerstrom, secretary and treasurer.

Dundas Quarries, Ltd., Hamilton, Ont., granted provincial charter authorizing them to carry on business of quarry masters and stone merchants and to deal in lime, cement, etc.

Lead Belt Concrete Brick Co., Flat River, Mo., by Harry Jennings, John Hunt, O. W. and Harley Swofford. Plant to have capacity of 5000 concrete blocks per eight-hour shift.

Ivanhoe Lime and Chemical Co. has been incorporated in Los Angeles, Calif., $500,000; R. E. Reynolds, Hawthorne; L. Brandenberg, Hal A. Irish, Los Angeles; M. F. Tufts, Barstow; B. G. Wood, Maywood.

Cambridge Limestone Products, Ltd., Beaverton, Ont., $100,000; Harry S. Cameron, Toronto; H. D. Bruce, Mara Township; George R. Yule, W. D. Woodward and W. W. Proctor of Beaverton. Will operate, quarry and deal in stone, lime, sand, cement, etc.

Quarries

Mountain Stone Co., Fort William, Ont., has contracted to deliver 2,000,000 tons of crushed stone to the Cleveland Cliffs Sand Co., Cleveland, Ohio, at the rate of 200,000 tons a year. Machinery has been ordered and production will begin on its delivery.

The quarry at Sparta, Ill., along the M. I. R. R. near Collins, has been purchased by a group of Benton, Ill., men who expect to operate it. The purchase was made through the Sparta State Bank which bid in the property at the receiver's sale several months ago.

Blair Limestone Co., a subsidiary of the Jones and Laughlin Steel Co., Pittsburgh, Penn., has suspended operations at its quarries between Millville and Halltown, Penn. This is the first complete shutdown there in 17 years of operation. About 50 men were employed at the quarries.

Gravenhurst Crushed Granite Co., Toronto, Ont., suffered a damage of about $20,000 from fire recently. The plant was of wooden structure and composed of a number of buildings which were destroyed. During the war $500,000 was expended on electric furnaces, motors, and other equipment and the plant converted into a potash factory. Since the war it has again been operated as a crushing plant. It is owned by Wettlaufer Bros., 180 Spadina avenue, Toronto.

Gypsum

Seneca Gypsum Co., has purchased property at Caledonia, Ont., on which it will erect a new plant. T. L. Snively is president of the company.

Silica Sand

Century Glass Sand Co., Clarksburg, W. Va., has reopened its plant at Imperial, W. Va., after an eight months' shut down.

Cement Products

H. C. Palmer is planning erection of a plant on Spring street, Fayetteville, Ark., to manufacture concrete blocks.

Reese and Foster have begun the operation of their concrete block and tile plant on Cascade avenue, Hood River, Ore.

C. G. Jensen has engaged in the manufacture of concrete products at Grant and Virginia streets, Bellingham, Wash.

Sand and Gravel

Iowa Sand and Gravel Co., Oskaloosa, Iowa, has let contract for a one-story sand and gravel handling and distributing plant, 55 by 175 ft., with conveying, loading and other equipment to cost $10,000. H. D. Bellemy is general manager.

Angeles Gravel and Supply Co., Port Angeles, Wash., has a new tow boat, the "Angeles" for general towing and bringing sand and gravel from Vancouver Island. The boat is 72 ft. long and is equipped with semi-Diesel engines and has a speed of 12 knots.

Lime

John Andreason and H. B. Decoria have begun the operation of a one-kiln lime plant at Arco, Idaho.

Standard White Lime Co., Guelph, Ont., had a fire at its plant recently which destroyed the hydrating plant and store room.

Ash Grove Lime and Portland Cement Co., Kansas City, Mo., is increasing the storage capacity at its Galloway, Mo., lime plant from 11,000 to 17,000 bbl. by the addition of two concrete tanks with a capacity of 3000 bbl. each. The tanks will be in use by August 1.

Cement

New Egyptian Portland Cement Co., Port Huron, Mich., reported to have plans authorized by directors to spend $100,000 on new equipment.

Personals

James Govan, architect in the Provincial Secretary's Department of Ontario since 1912, has resigned this position to become head of the research department of the Ontario Gypsum Co., Ltd., Paris, Ont.

Victor J. Azbe, consulting lime-plant engineer, St. Louis, Mo., has been retained by the Chas. Warner Co., Wilmington, Del., and the Gager Lime Co., Sherwood, Tenn., in connection with lime manufacturing problems.

F. H. Richardson, who has been field engineer for the Portland Cement Association at Spokane, Wash., for several years, has been transferred to the Salt Lake City, Utah, office. C. D. Forsbeck succeeds Mr. Richardson at Spokane.

Manufacturers

Lapeer Trailer Corporation, Lapeer, Mich., has appointed L. M. Bovaird as manager of its Detroit branch office.

Scott Valve Manufacturing Co., Detroit, Mich., has appointed H. P. Rogers and Co., Leader-News building, Cleveland, Ohio, as its representative there for the complete line of Scott bronze and iron body valves.

Sullivan Machinery Co., Chicago, has appointed Raymond B. Hosken as general sales manager of domestic sales. Mr. Hosken has been with the sales department of the company at the Chicago and Sidney, Australia offices since graduating from the University of Michigan in 1910.

Marion Steam Shovel Co., Marion, Ohio, has established direct factory branch warehouses and offices at 571 Howard street, San Francisco and 322 East Third street, Los Angeles, Calif. At these points a complete line of replacement parts will be carried, with Bert Engstrom and R. P. Ryan at the San Francisco office and John Harvey at the Los Angeles office.